US011080674B1

(12) **United States Patent**
Chen et al.

(10) **Patent No.: US 11,080,674 B1**
(45) **Date of Patent: Aug. 3, 2021**

(54) **POINT OF SALE SYSTEM**

(71) Applicant: **Square, Inc.**, San Francisco, CA (US)

(72) Inventors: **Yenliang Chen**, San Francisco, CA (US); **Isreal Blagdan**, Oakland, CA (US); **Michael C. Lamfalusi**, Cupertino, CA (US); **Kartik Lamba**, Berkeley, CA (US); **Jeremy Wade**, San Francisco, CA (US)

(73) Assignee: **Square, Inc.**, San Francisco, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 379 days.

(21) Appl. No.: **15/003,649**

(22) Filed: **Jan. 21, 2016**

Related U.S. Application Data

(63) Continuation of application No. 14/592,255, filed on Jan. 8, 2015, now abandoned.
(Continued)

(51) **Int. Cl.**

G06Q 20/20	(2012.01)
G06Q 20/34	(2012.01)
G06F 3/0481	(2013.01)
G06F 3/0488	(2013.01)
G06F 3/0484	(2013.01)

(52) **U.S. Cl.**
CPC ***G06Q 20/20*** (2013.01); ***G06F 3/0481*** (2013.01); ***G06F 3/0484*** (2013.01); ***G06F 3/04883*** (2013.01); ***G06Q 20/202*** (2013.01); ***G06Q 20/204*** (2013.01); ***G06Q 20/341*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,128,349 A 4/1964 Boesch et al.
4,150,784 A 4/1979 Moorman et al.
(Continued)

FOREIGN PATENT DOCUMENTS

AU 2324402 A 6/2002
AU 2015349752 B2 7/2017
(Continued)

OTHER PUBLICATIONS

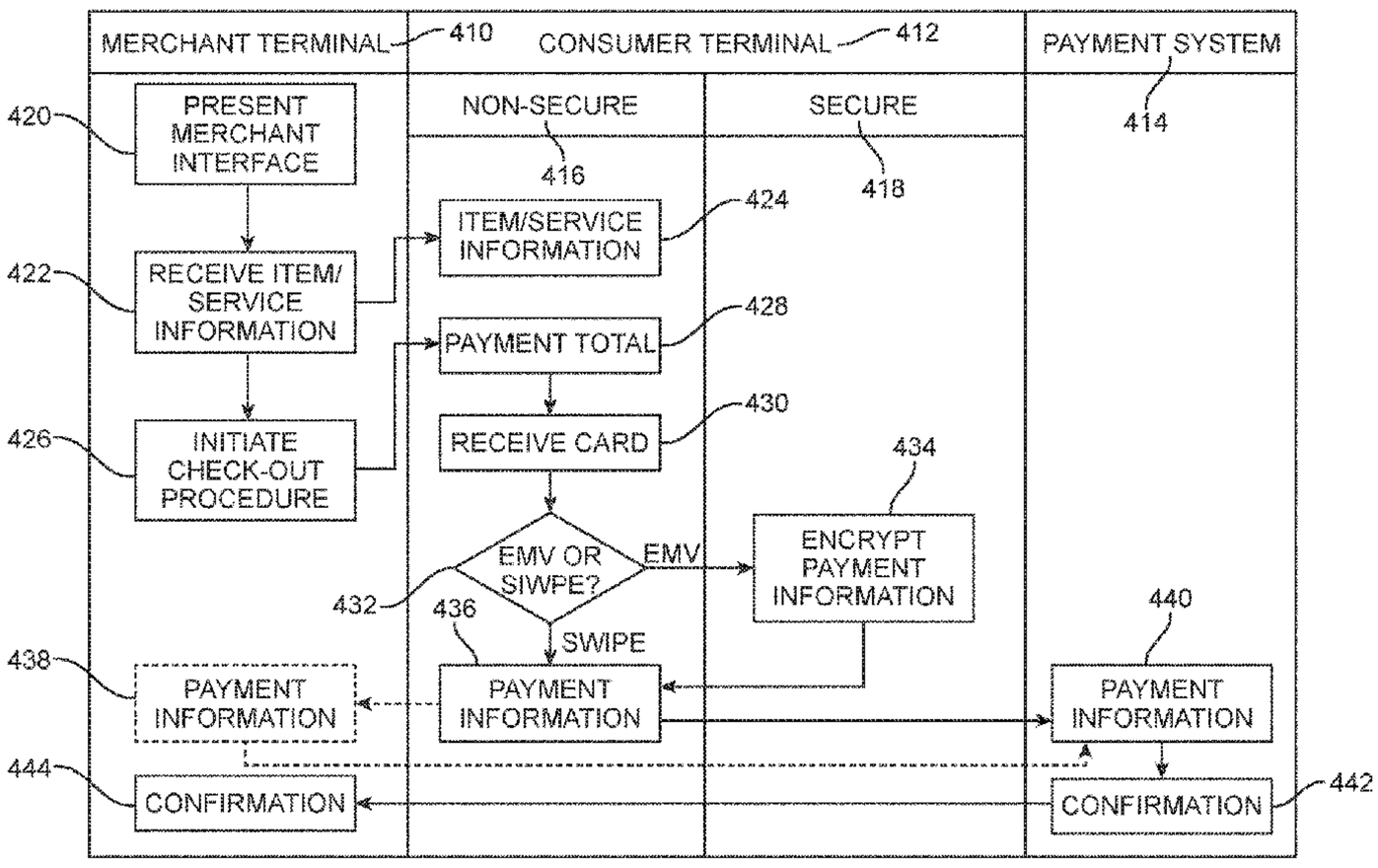
Restriction Requirement dated Feb. 27, 2015, for U.S. Appl. No. 14/592,102, of Chen, Y., et al., filed Jan. 8, 2015.
(Continued)

Primary Examiner — Mamon Obeid
(74) *Attorney, Agent, or Firm* — Maynard Cooper & Gale, P.C.; Brian T. Sattizahn, Esq.

(57) **ABSTRACT**

A point-of-sale system is a dual-screen stand assembly that includes a merchant terminal and a consumer terminal. The merchant terminal and the consumer terminal can be mated together in a fixed position to form a single unitary stand, or can be separated from each other in a separated position with each terminal serving as its own separate stand. The merchant terminal supports a merchant computing device and is oriented in a merchant-facing direction. The consumer terminal is detachably mated to the merchant terminal and supports a consumer computing device that is oriented in a consumer-facing direction. The point-of-sale system also includes a card reader as part of the customer terminal to perform a payment. The card reader is configured to accepting swipe cards, chip cards or contactless (EMV or NFC) payments.

13 Claims, 17 Drawing Sheets



Related U.S. Application Data

(60) Provisional application No. 62/053,029, filed on Sep. 19, 2014.

(56) References Cited

U.S. PATENT DOCUMENTS

4,304,385	A	12/1981	Farouche et al.	
4,776,003	A	10/1988	Harris	
4,860,336	A	8/1989	D'Avello et al.	
5,221,838	A	6/1993	Gutman et al.	
5,331,138	A *	7/1994	Saroya	G06K 7/0004 235/438
5,351,296	A	9/1994	Sullivan	
5,388,155	A	2/1995	Smith	
5,408,513	A	4/1995	Busch, Jr. et al.	
5,494,136	A *	2/1996	Humble	A47F 9/047 186/61
5,714,741	A	2/1998	Pieterse et al.	
5,729,591	A	3/1998	Bailey	
5,740,232	A	4/1998	Pailles et al.	
5,838,773	A	11/1998	Eisner et al.	
5,850,599	A	12/1998	Seiderman	
5,867,795	A	2/1999	Novis et al.	
5,940,510	A	8/1999	Curry et al.	
5,963,647	A *	10/1999	Downing	G06Q 20/04 235/379
5,970,146	A *	10/1999	McCall	G06F 3/0416 345/173
6,010,067	A	1/2000	Elbaum	
6,062,477	A *	5/2000	Wike, Jr.	G06F 1/16 235/383
6,098,881	A	8/2000	Deland, Jr. et al.	
6,098,888	A *	8/2000	Praden	G06K 7/0086 235/492
6,144,336	A	11/2000	Preston et al.	
6,157,966	A *	12/2000	Montgomery	G06K 7/0008 235/375
6,234,389	B1	5/2001	Valliani et al.	
6,278,779	B1	8/2001	Bryant et al.	
6,321,339	B1 *	11/2001	French	G06F 21/33 726/2
6,481,623	B1	11/2002	Grant et al.	
6,766,994	B2 *	7/2004	Serbinski	F16M 11/10 248/299.1
6,990,683	B2	1/2006	Itabashi	
7,003,316	B1	2/2006	Elias et al.	
7,004,385	B1 *	2/2006	Douglass	G06Q 20/327 235/379
7,048,184	B2	5/2006	Persky	
7,066,382	B2	6/2006	Kaplan	
7,083,090	B2	8/2006	Zuili	
7,163,148	B2	1/2007	Durbin et al.	
7,210,627	B2	5/2007	Morley et al.	
7,363,054	B2	4/2008	Elias et al.	
7,370,804	B2	5/2008	Ishii	
7,424,732	B2	9/2008	Matsumoto et al.	
7,433,452	B2	10/2008	Taylor et al.	
7,591,425	B1	9/2009	Zuili et al.	
7,597,250	B2 *	10/2009	Finn	G06K 19/07732 235/380
7,673,799	B2	3/2010	Hart et al.	
7,712,670	B2	5/2010	Sauerwein, Jr. et al.	
7,810,729	B2	10/2010	Morley, Jr.	
7,866,546	B1 *	1/2011	Vance	G07F 9/006 235/379
7,896,248	B2	3/2011	Morley, Jr.	
8,086,531	B2	12/2011	Litster et al.	
8,117,125	B1	2/2012	Kawan et al.	
8,126,734	B2	2/2012	Dicks et al.	
8,261,064	B2 *	9/2012	Ditzman	G06F 21/83 713/164
8,265,553	B2	9/2012	Cheon et al.	
8,397,988	B1	3/2013	Zuili	
8,558,685	B2 *	10/2013	Long	G06F 21/606 340/500
8,768,838	B1	7/2014	Hoffman	
8,944,322	B2 *	2/2015	White	G06K 7/1096 235/383
8,988,354	B2 *	3/2015	Milhe	G06F 1/1628 345/168
9,020,853	B2	4/2015	Hoffman et al.	
9,047,639	B1 *	6/2015	Quintiliani	G06Q 40/025
9,092,766	B1 *	7/2015	Bedier	G07G 1/01
9,129,274	B1 *	9/2015	Mocko	F16M 11/10
9,286,494	B1 *	3/2016	Lamfalusi	G06K 13/0875
9,367,842	B2 *	6/2016	Quigley	H04L 9/3271
9,589,428	B2 *	3/2017	Edwards	E05B 65/461
9,679,286	B2	6/2017	Colnot et al.	
9,704,355	B2 *	7/2017	Beatty	G06Q 20/202
9,741,211	B2	8/2017	Skiles	
9,792,783	B1 *	10/2017	Beatty	G06Q 20/206
9,881,288	B1 *	1/2018	Bell	G06F 3/04886
9,911,266	B2 *	3/2018	Weston	G06Q 50/06
9,916,570	B2	3/2018	Edwards et al.	
9,946,506	B2 *	4/2018	Ting	G06F 1/1654
9,965,116	B1 *	5/2018	Wolter	G07F 9/023
10,019,605	B2 *	7/2018	Boysen	G06F 21/60
10,140,604	B1 *	11/2018	Douthat	G06K 7/08
10,318,953	B2 *	6/2019	Binder	G06K 7/0008
10,475,024	B1 *	11/2019	Behren	G06Q 20/3829
10,504,096	B1 *	12/2019	Hafemann	G06F 3/044
10,579,989	B1 *	3/2020	Binder	H04B 5/02
10,713,904	B2 *	7/2020	Beatty	G07G 1/0009
10,733,588	B1	8/2020	Mocko et al.	
10,762,196	B2 *	9/2020	Cat	G06Q 20/206
10,783,509	B2 *	9/2020	Pattarawuttiwong	G07G 1/12
2002/0082993	A1 *	6/2002	Hoyos	G07F 19/202 705/43
2002/0091633	A1	7/2002	Proctor	
2002/0153414	A1	10/2002	Stoutenburg et al.	
2002/0166891	A1 *	11/2002	Stoutenburg	G06Q 20/042 235/379
2003/0004876	A1 *	1/2003	Jacobson	H04M 17/026 705/41
2003/0066893	A1 *	4/2003	Yap	G07F 7/0866 235/487
2003/0135406	A1	7/2003	Rowe	
2003/0135418	A1	7/2003	Shekhar et al.	
2003/0135751	A1 *	7/2003	O'Donnell	G07F 7/10 705/16
2003/0154414	A1	8/2003	von Mueller et al.	
2003/0164398	A1	9/2003	Walker et al.	
2003/0183691	A1	10/2003	Lahteenmaki et al.	
2003/0191713	A1 *	10/2003	Yap	H04N 21/4182 705/41
2004/0012875	A1	1/2004	Wood	
2004/0034564	A1	2/2004	Liu	
2004/0041911	A1	3/2004	Odagiri et al.	
2004/0043650	A1	3/2004	Yang et al.	
2004/0059682	A1	3/2004	Hasumi et al.	
2004/0167820	A1	8/2004	Melick et al.	
2004/0204082	A1	10/2004	Abeyta	
2005/0039052	A1 *	2/2005	O'Donnell	G06Q 20/341 726/4
2005/0097015	A1	5/2005	Wilkes et al.	
2005/0109841	A1	5/2005	Ryan et al.	
2005/0116840	A1 *	6/2005	Simelius	H04M 1/67 341/22
2005/0236480	A1	10/2005	Vrotsos et al.	
2005/0283403	A1 *	12/2005	Ramirez	G07G 1/0018 705/16
2006/0032905	A1	2/2006	Bear et al.	
2006/0049255	A1	3/2006	von Mueller et al.	
2006/0168663	A1 *	7/2006	Viljoen	G06Q 30/06 726/27
2006/0223580	A1	10/2006	Antonio et al.	
2006/0226224	A1 *	10/2006	Henry	G07F 19/201 235/449
2006/0242696	A1 *	10/2006	Cruzado	G06F 21/71 726/16
2007/0067833	A1	3/2007	Colnot	
2007/0136216	A1 *	6/2007	Simcik	G07B 17/00733 705/410

(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0168300 A1 7/2007 Quesselaire et al.
2007/0194104 A1 8/2007 Fukuda et al.
2007/0198436 A1 8/2007 Weiss
2007/0251997 A1* 11/2007 Brown G06K 7/0008 235/380
2007/0257110 A1 11/2007 Schmidt et al.
2008/0016456 A1 1/2008 Friedland et al.
2008/0091617 A1 4/2008 Hazel et al.
2008/0209212 A1* 8/2008 Ditzman G06F 21/84 713/167
2008/0215887 A1 9/2008 Hart et al.
2009/0006262 A1* 1/2009 Brown G06Q 20/4016 705/64
2009/0070583 A1 3/2009 von Mueller et al.
2009/0102813 A1* 4/2009 Mamba G06F 3/0446 345/174
2009/0112768 A1 4/2009 Hammad et al.
2009/0119221 A1* 5/2009 Weston G07F 7/1008 705/76
2009/0164326 A1 6/2009 Bishop et al.
2009/0173790 A1* 7/2009 Hart G06K 7/084 235/449
2009/0222383 A1* 9/2009 Tato G06Q 20/12 705/71
2009/0307142 A1* 12/2009 Mardikar G06Q 20/40 705/72
2010/0020971 A1* 1/2010 Hanks G06Q 30/06 380/255
2010/0057620 A1* 3/2010 Li G06Q 20/202 705/71
2010/0057624 A1* 3/2010 Hurt G06Q 20/20 705/76
2010/0211469 A1* 8/2010 Salmon G06Q 20/20 705/16
2010/0243732 A1 9/2010 Wallner
2010/0262504 A1* 10/2010 Tamura G06Q 20/209 705/24
2011/0176004 A1* 7/2011 Chaussade G07F 17/3241 348/150
2011/0199308 A1* 8/2011 Nativel G06F 21/606 345/168
2011/0321173 A1* 12/2011 Weston G06Q 20/4012 726/27
2012/0023026 A1* 1/2012 Chen G06Q 20/3278 705/75
2012/0066079 A1* 3/2012 Falzone G06Q 20/202 705/16
2012/0197744 A1* 8/2012 Rose G06Q 10/087 705/17
2012/0242526 A1* 9/2012 Perez H04M 1/72415 341/176
2012/0254038 A1* 10/2012 Mullen G06Q 30/0238 705/44
2012/0286040 A1 11/2012 Ko
2012/0290420 A1* 11/2012 Close G07G 1/14 705/17
2013/0006847 A1* 1/2013 Hammad G06Q 20/32 705/39
2013/0050084 A1* 2/2013 Soffer G06F 21/85 345/163
2013/0144731 A1* 6/2013 Baldwin G06Q 20/204 705/17
2013/0153656 A1* 6/2013 Skiles G07G 1/009 235/383
2013/0155595 A1* 6/2013 Herring G07G 1/0018 361/679.21
2013/0198086 A1* 8/2013 Mardikar G06Q 20/40 705/71
2013/0246171 A1* 9/2013 Carapelli G06Q 20/326 705/14.51
2013/0282501 A1 10/2013 Edwards et al.
2013/0299574 A1* 11/2013 Theobald G06K 7/0004 235/380
2014/0022211 A1* 1/2014 Karpin G06F 3/04182 345/174
2014/0047390 A1* 2/2014 Thorsander G06F 3/04883 715/835
2014/0071043 A1* 3/2014 Jung G06F 3/03 345/156
2014/0078070 A1 3/2014 Armstrong-Muntner
2014/0089174 A1 3/2014 Carapelli et al.
2014/0095387 A1* 4/2014 Colnot G06Q 20/42 705/44
2014/0096222 A1* 4/2014 Colnot G06F 21/74 726/9
2014/0097249 A1* 4/2014 Gomez G06Q 20/341 235/440
2014/0101035 A1* 4/2014 Tanner G06Q 20/3278 705/39
2014/0143089 A1* 5/2014 Campos G07F 9/001 705/26.8
2014/0172607 A1* 6/2014 Skiles G06Q 20/208 705/23
2014/0183260 A1 7/2014 Sancak
2014/0214688 A1 7/2014 Weiner et al.
2014/0252089 A1* 9/2014 Bostwick A47F 9/04 235/383
2014/0256251 A1 9/2014 Caceres et al.
2014/0283857 A1* 9/2014 Liu A24F 40/40 131/329
2015/0095133 A1 4/2015 Parker et al.
2015/0095134 A1* 4/2015 Parker G06Q 20/322 705/14.38
2015/0095241 A1* 4/2015 Edwards G06F 21/36 705/72
2015/0100498 A1* 4/2015 Edwards H04L 9/3226 705/72
2015/0161601 A1* 6/2015 Matsumoto G06Q 20/353 705/17
2015/0199882 A1* 7/2015 Fernando G06F 1/1696 345/173
2015/0261314 A1* 9/2015 Herring G06Q 20/20 345/156
2015/0324781 A1* 11/2015 Saitoh G06Q 20/206 705/17
2015/0363757 A1 12/2015 Mocko et al.
2016/0005020 A1* 1/2016 Fernando G07G 1/14 705/21
2016/0012465 A1* 1/2016 Sharp G06Q 20/386 705/14.17
2016/0026990 A1* 1/2016 Rezayee G06F 3/0482 705/64
2016/0051067 A1* 2/2016 Law F16M 11/041 361/679.22
2016/0070964 A1* 3/2016 Conrad H04N 5/232 348/150
2016/0117529 A1* 4/2016 Bedier G06K 7/087 705/17
2016/0117659 A1 4/2016 Bedier et al.
2016/0117662 A1 4/2016 Bedier et al.
2016/0124627 A1* 5/2016 Beatty G06Q 20/202 705/16
2016/0125181 A1* 5/2016 Dai Zovi G06F 3/0236 726/19
2016/0125376 A1* 5/2016 Beatty G06Q 20/204 705/72
2016/0148023 A1* 5/2016 Lamfalusi G06K 7/084 235/380
2016/0275478 A1 9/2016 Li et al.
2016/0335461 A1 11/2016 Lamfalusi et al.
2016/0335462 A1 11/2016 Lamfalusi et al.
2017/0154334 A1* 6/2017 Lewis G06Q 20/4012
2017/0185363 A1* 6/2017 Ting G06F 1/1626
2017/0221035 A1 8/2017 Edwards et al.
2017/0308882 A1* 10/2017 Bedier G07G 1/0009
2017/0309135 A1* 10/2017 Beatty G06Q 20/202
2017/0311737 A1 11/2017 Law et al.
2017/0364888 A1* 12/2017 Bell G06F 3/04842

(56) **References Cited**

U.S. PATENT DOCUMENTS

2018/0005224	A1*	1/2018	Binder	H04W 4/80
2018/0033255	A1*	2/2018	Beatty	G06Q 20/202
2018/0039965	A1*	2/2018	Han	G07F 7/1033
2018/0150818	A1*	5/2018	Mocko	G06Q 20/202
2018/0174013	A1*	6/2018	Lee	G06K 19/07707
2018/0174391	A1*	6/2018	Weston	G07F 7/1091
2018/0316815	A1*	11/2018	Douthat	G06F 1/3287

FOREIGN PATENT DOCUMENTS

CA	2 955 454	A1	1/2016
CN	106716470	A	5/2017
DE	20320080	U1	4/2004
EP	0 895 203	A2	2/1999
EP	1 874 014	A2	1/2008
FR	2 812 744	A1	2/2002
FR	2 812 745	A1	2/2002
FR	2 834 156	A1	6/2003
GB	2 427 059	A	12/2006
JP	H09231285	A	9/1997
JP	2000-030146	A	1/2000
JP	2000-276539	A	10/2000
JP	2001-222595	A	8/2001
JP	2002-074507	A	3/2002
JP	2002-123771	A	4/2002
JP	2002-279320	A	9/2002
JP	2002-352166	A	12/2002
JP	2002-358285	A	12/2002
JP	2003-108777	A	4/2003
JP	2003-281453	A	10/2003
JP	2003-308438	A	10/2003
JP	2004-054651	A	2/2004
JP	2004-062733	A	2/2004
JP	2004-078553	A	3/2004
JP	2004-078662	A	3/2004
JP	2004-199405	A	7/2004
JP	4248820	B2	4/2009
KR	10-1999-0066397	A	8/1999
KR	10-1999-0068618	A	9/1999
KR	200225019	B1	3/2001
KR	10-2003-0005936	A	1/2003
KR	10-2003-0005984	A	1/2003
KR	10-2003-0012910	A	2/2003
KR	200333809	B1	11/2003
KR	10-2004-0016548	A	2/2004
KR	100447431	B1	8/2004
KR	200405877	B1	1/2006
KR	100649151	B1	11/2006
KR	10-2007-0107990	A	11/2007
KR	100842484	B1	6/2008
RU	2284578	C1	9/2006
WO	1998/012674	A2	3/1998
WO	2000/011624	A1	3/2000
WO	2000/025277	A1	5/2000
WO	2001/086599	A2	11/2001
WO	2002/033669	A1	4/2002
WO	2002/043020	A2	5/2002
WO	2002/082388	A1	10/2002
WO	2002/084548	A1	10/2002
WO	2003/044710	A1	5/2003
WO	2003/079259	A1	9/2003
WO	2004/023366	A1	3/2004
WO	2006/131708	A1	12/2006
WO	2011/051757	A1	5/2011
WO	2012/078990	A1	6/2012
WO	2013/051032	A1	4/2013
WO	2015/001468	A1	1/2015
WO	2015/191468	A1	12/2015
WO	2016/014346	A1	1/2016
WO	2016/069775	A1	5/2016
WO	2016/081804	A1	5/2016
WO	2017/222696	A1	12/2017

OTHER PUBLICATIONS

Non-Final Office Action dated Mar. 13, 2015, for U.S. Appl. No. 14/572,692, of Bell, B., et al., filed Dec. 16, 2014.
Non-Final Office Action dated May 21, 2015, for U.S. Appl. No. 14/592,102, of Chen, Y., et al., filed Jan. 8, 2015.
Final Office Action dated Jul. 10, 2015, for U.S. Appl. No. 14/572,692, of Bell, B., et al., filed Dec. 16, 2014.
Non-Final Office Action dated Sep. 16, 2015, for U.S. Appl. No. 14/549,338, of Lamfalusi, M.C., et al., filed Nov. 20, 2014.
Notice of Allowance dated Nov. 10, 2015, for U.S. Appl. No. 14/549,338, of Lamfalusi, M.C., et al., filed Nov. 20, 2014.
Final Office Action dated Dec. 9, 2015, for U.S. Appl. No. 14/592,102, of Chen, Y., et al., filed Jan. 8, 2015.
Non-Final Office Action dated Jan. 14, 2016, for U.S. Appl. No. 14/947,162, of Lamfalusi, M.C., et al., filed Nov. 20, 2015.
Restriction Requirement dated Jan. 22, 2016, for U.S. Appl. No. 14/848,123, of Guise, M., et al., filed Sep. 8, 2015.
International Search Report and Written Opinion for PCT Application No. PCT/US2015/051082 dated Dec. 18, 2015.
International Search Report and Written Opinion for PCT Application No. PCT/US2015/051090 dated Dec. 21, 2015.
International Search Report and Written Opinion for PCT Application No. PCT/US2015/061771 dated Jan. 29, 2016.
Notice of Acceptance for Australian Patent Application No. 2015349752, dated Jul. 3, 2017.
Examination Report No. 1 for Australian Patent Application No. 2017245444, dated Dec. 1, 2017.
Notice of Allowance dated Jan. 5, 2017, for U.S. Appl. No. 15/220,262, of Lamfalusi, M.C., et al., filed Jul. 26, 2016.
Final Office Action dated Jan. 27, 2017, for U.S. Appl. No. 14/848,123, of Guise, M., et al., filed Sep. 8, 2015.
Non-Final Office Action dated Aug. 25, 2016, for U.S. Appl. No. 15/220,262, of Lamfalusi, M.C., et al., filed Jul. 26, 2016.
Non-Final Office Action dated Aug. 25, 2016, for U.S. Appl. No. 15/221,383, of Lamfalusi, M.C., et al., filed Jul. 27, 2016.
Non-Final Office Action dated Mar. 11, 2016, for U.S. Appl. No. 14/572,692, of Bell, B., et al., filed Dec. 16, 2014.
Notice of Allowance dated Mar. 25, 2016, for U.S. Appl. No. 14/947,162, of Lamfalusi, M.C., et al., filed Nov. 20, 2015.
International Search Report and Written Opinion for International Application No. PCT/US2017/033370, dated Jul. 21, 2017.
"At a Glance PCI Data Storage, PCI Data Storage Do's and Don'ts," PCI Security Standards Council Llc, dated Dec. 31, 2008, Retrieved from the Internet URL: http://web.archive.org/web/20140704155237/https://www.pcisecuritystandards.org/pdfs/pci_fs_data_storage.pdf, on Feb. 8, 2017, pp. 1-2.
Notice of Allowance dated Apr. 21, 2017, for U.S. Appl. No. 15/221,383, of Lamfalusi, M.C., et al., filed Jul. 26, 2016.
International Search Report and Written Opinion for PCT Application No. PCT/US2016/068914 dated Feb. 16, 2017.
Non-Final Office Action dated Jul. 20, 2016, for U.S. Appl. No. 14/848,123, of Guise, M., et al., filed Sep. 8, 2015.
Non-Final Office Action dated Mar. 11, 2016, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
Non-Final Office Action dated Apr. 12, 2016, for U.S. Appl. No. 14/982,840, of Edwards, T., et al., filed Dec. 29, 2015.
Final Office Action dated Sep. 23, 2016, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
Notice of Allowance dated Oct. 24, 2016, for U.S. Appl. No. 14/982,840, of Edwards, T., et al., filed Dec. 29, 2015.
Non-Final Office Action dated Mar. 31, 2017, for U.S. Appl. No. 15/241,901, of Edwards, T., et al., filed Aug. 19, 2016.
Non-Final Office Action dated Sep. 8, 2017, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
Notice of Allowance dated Oct. 30, 2017, for U.S. Appl. No. 15/241,901, of Edwards, T., et al., filed Aug. 19, 2016.
Non-Final Office Action dated Feb. 20, 2018, for U.S. Appl. No. 15/793,187, of Mocko, C.L., et al., filed Oct. 25, 2017.
Final Office Action dated Apr. 25, 2018, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
Notice of Allowance dated Jun. 18, 2018, for U.S. Appl. No. 15/793,187, of Mocko, C.L., et al., filed Oct. 25, 2017.

(56) **References Cited**

OTHER PUBLICATIONS

Non-Final Office Action dated Jun. 29, 2018, for U.S. Appl. No. 15/003,580, of Chen, Y., et al., filed Jan. 21, 2016.
Advisory Action dated Jul. 5, 2018, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
International Search Report and Written Opinion for International Application No. PCT/US2015/040819, dated Oct. 13, 2015.
Extended European Search Report for European Patent Application No. 15825575.2, dated Nov. 28, 2017.
Office Action for European Patent Application No. 15 825 575.2, dated Oct. 1, 2018.
Non-Final Office Action dated Jan. 10, 2019, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
Non-Final Office Action dated Feb. 26, 2019, for U.S. Appl. No. 16/051,381, of Chen, Y., et al., filed Jul. 31, 2018.
Summons to Oral Proceeding for European Patent Application No. 15825575.2, mailed Mar. 6, 2019.
Non-Final Office Action dated Apr. 2, 2019, for U.S. Appl. No. 15/003,580, of Chen, Y., et al., filed Jan. 21, 2016.
Loisel Y., "Designing Next-Generation Payment Terminals That Meet PCI PTS 3.x Requirements," Application note 4809, Maxim Integrated, Retrieved from URL: https://www.maximintegrated.com/en/app-notes/index.mvp/id/4809, dated May 19, 2011.
Notice of Allowance dated Jul. 19, 2019, for U.S. Appl. No. 14/752,698, of Rezayee, A., et al., filed Jun. 26, 2015.
Non-Final Office Action dated Sep. 5, 2019, for U.S. Appl. No. 16/051,381, of Chen, Y., et al., filed Jul. 31, 2018.
"Connection of Terminal Equipment to the Telephone Network," FCC 47 CFR Part 68, Retrieved from the URL: http://www.tscm.com/FCC47CFRpart68.pdf, on Sep. 24, 2019 Oct. 1, 1999 Edition.
"EMBEDDED FINancial transactional IC card READer," Retrieved from the URL: https://cordis.europa.eu/project/rcn/58338/factsheet/en.
Geethapriya Venkataramani and Srividya Gopalan., "Mobile phone based RFID architecture for secure electronic payments using RFID credit cards," 2007 IEEE, (ARES'07).
"Guideline for the Use of Advanced Authentication Technology," FIPS 190, Sep. 28, 1994.
"Identification cards—Recording technique—Part 4—Location of read-only magnetic tracks—Track 1 and 2," ISO/IEC7811-4:1995, International Organization for Standardization, Aug. 1995.
Jerome Svigals., "The Long Life and Imminent Death of the Mag-stripe Card," IEEE Spectrum, vol. 49, Issue 61, Jun. 2012.
"Magensa's Decryption Services and MagTek's MagneSafe™ Bluetooth Readers Selected by eProcessing Network to Implement Secure Customer Card Data with Mobile Devices," Retrieved from the URL: https://www.magnensa.net/aboutus/articles/eProcessing-rev1.pdf Apr. 14, 2008.
Martha E. Haykin et al., "Smart Card Technology: New Methods for Computer Access Control," NIST Special Publication 500-157, Sep. 1988.
"MSP430x1xx Family User's Guide," (including 2016 correction sheet at 2), Texas Instruments Inc., 2006.
Spegele, Joseph Brain., "A Framework for Evaluating Application of Smart Cards and Related Technology Within the Department of Defense," Naval Postgraduate School, Jan. 1995.
Stephen A. Sherman et al., "Secure Network Access Using Multiple Applications of AT&T's Smart Card," AT&T Technical Journal, Sep./Oct. 1994.
Final Office Action dated Oct. 18, 2019, for U.S. Appl. No. 15/003,580, of Chen, Y., et al., filed Jan. 21, 2016.
Non-Final Office Action dated Dec. 12, 2019, for U.S. Appl. No. 16/146,943, of Mocko, C.L., et al., filed Sep. 28, 2018.
Advisory Action dated Jan. 6, 2020, for U.S. Appl. No. 15/003,580, of Chen, Y., et al., filed Jan. 21, 2016.
Non-Final Office Action dated Feb. 27, 2020, for U.S. Appl. No. 16/051,381, of Chen, Y., et al., filed Jul. 31, 2018.
Notice of Allowance dated Mar. 25, 2020, for U.S. Appl. No. 16/146,943, of Mocko, C.L., et al., filed Sep. 28, 2018.
Final Office Action dated Jun. 23, 2020, for U.S. Appl. No. 16/051,381, of Chen, Y., et al., filed Jul. 31, 2018.
Advisory Action dated Sep. 1, 2020, for U.S. Appl. No. 16/051,381, of Chen, Y., et al., filed Jul. 31, 2018.

* cited by examiner

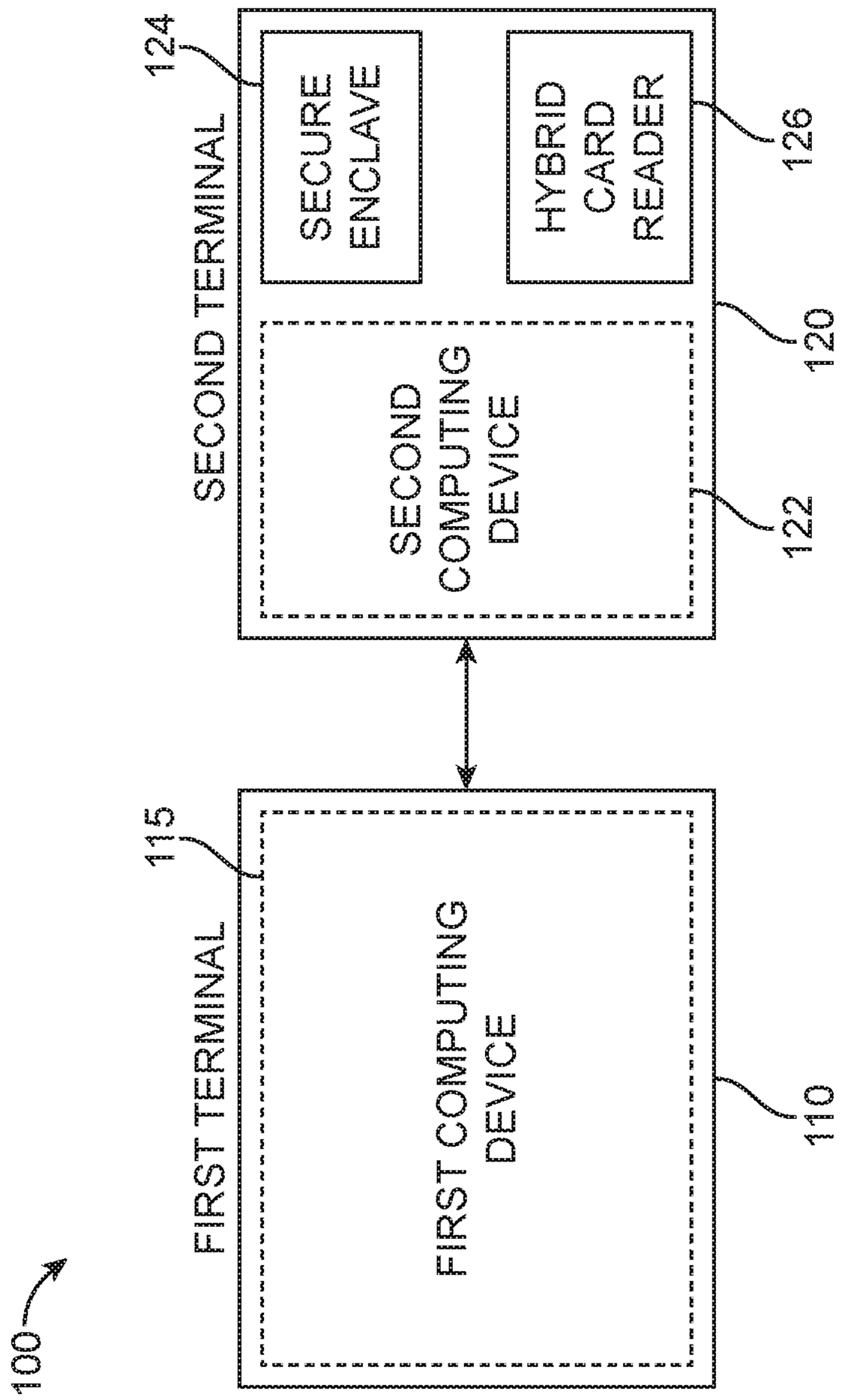

100
FIRST TERMINAL
115
FIRST COMPUTING DEVICE
110
SECOND TERMINAL
120
SECURE ENCLAVE
124
HYBRID CARD READER
126
SECOND COMPUTING DEVICE
122

FIG. 1

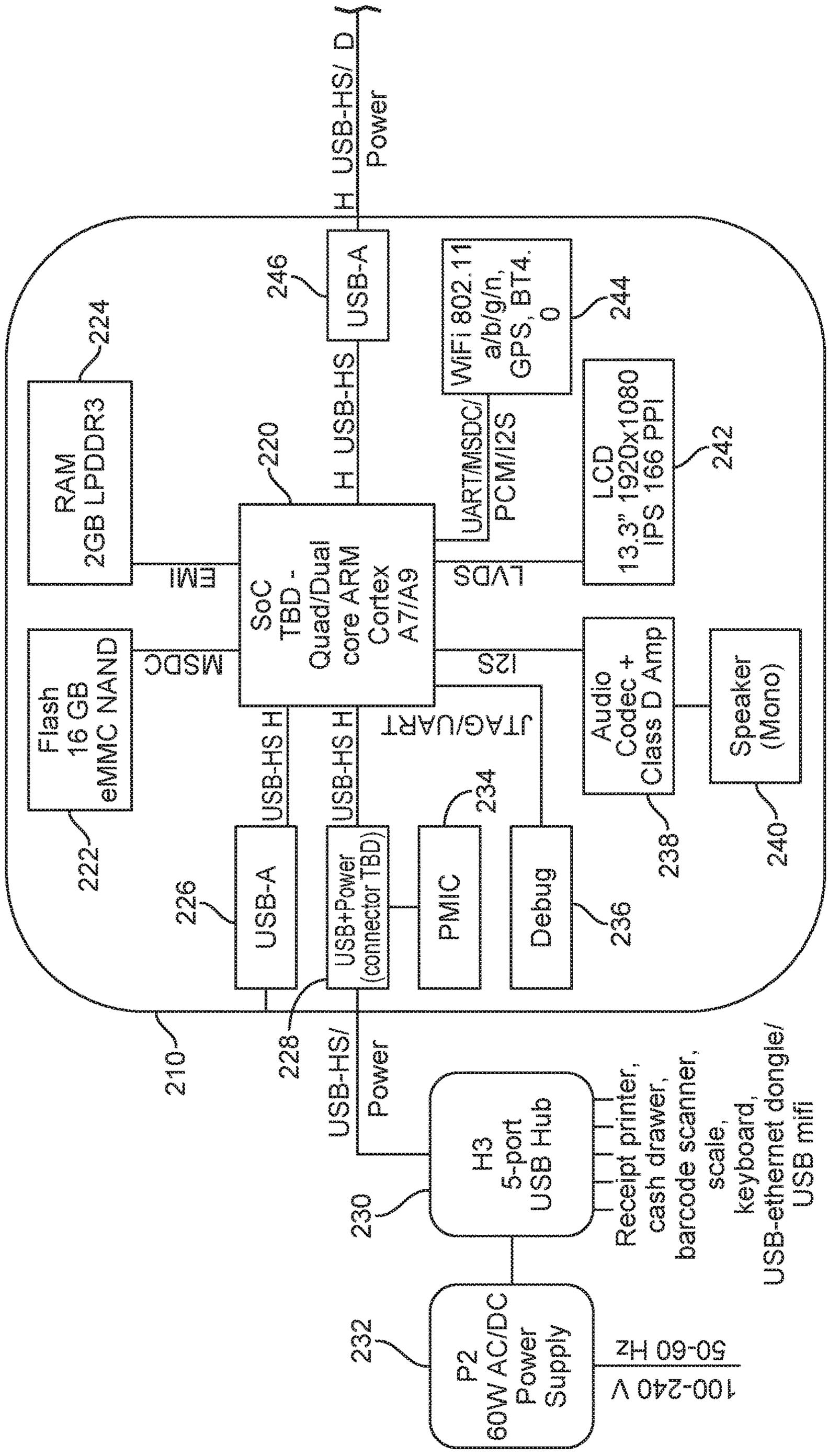

210
USB-HS/ Power
228
USB-HS/ D
Power
246
USB-A
224
RAM
2GB LPDDR3
220
SoC
TBD -
Quad/Dual
core ARM
Cortex
A7/A9
H USB-HS
UART/MSDC/
PCM/I2S
WiFi 802.11
a/b/g/n,
GPS, BT4.
0
244
LCD
13.3" 1920x1080
IPS 166 PPI
242
EMI
LVDS
Flash
16 GB
eMMC NAND
222
MSDC
I2S
Audio
Codec +
Class D Amp
238
Speaker
(Mono)
240
USB-HS H
USB-HS H
JTAG/UART
USB-A
226
USB+Power
(connector TBD)
PMIC
234
Debug
236
230
H3
5-port
USB Hub
Receipt printer,
cash drawer,
barcode scanner,
scale,
keyboard,
USB-ethernet dongle/
USB mifi
232
P2
60W AC/DC
Power
Supply
100-240 V
50-60 Hz

FIG. 2

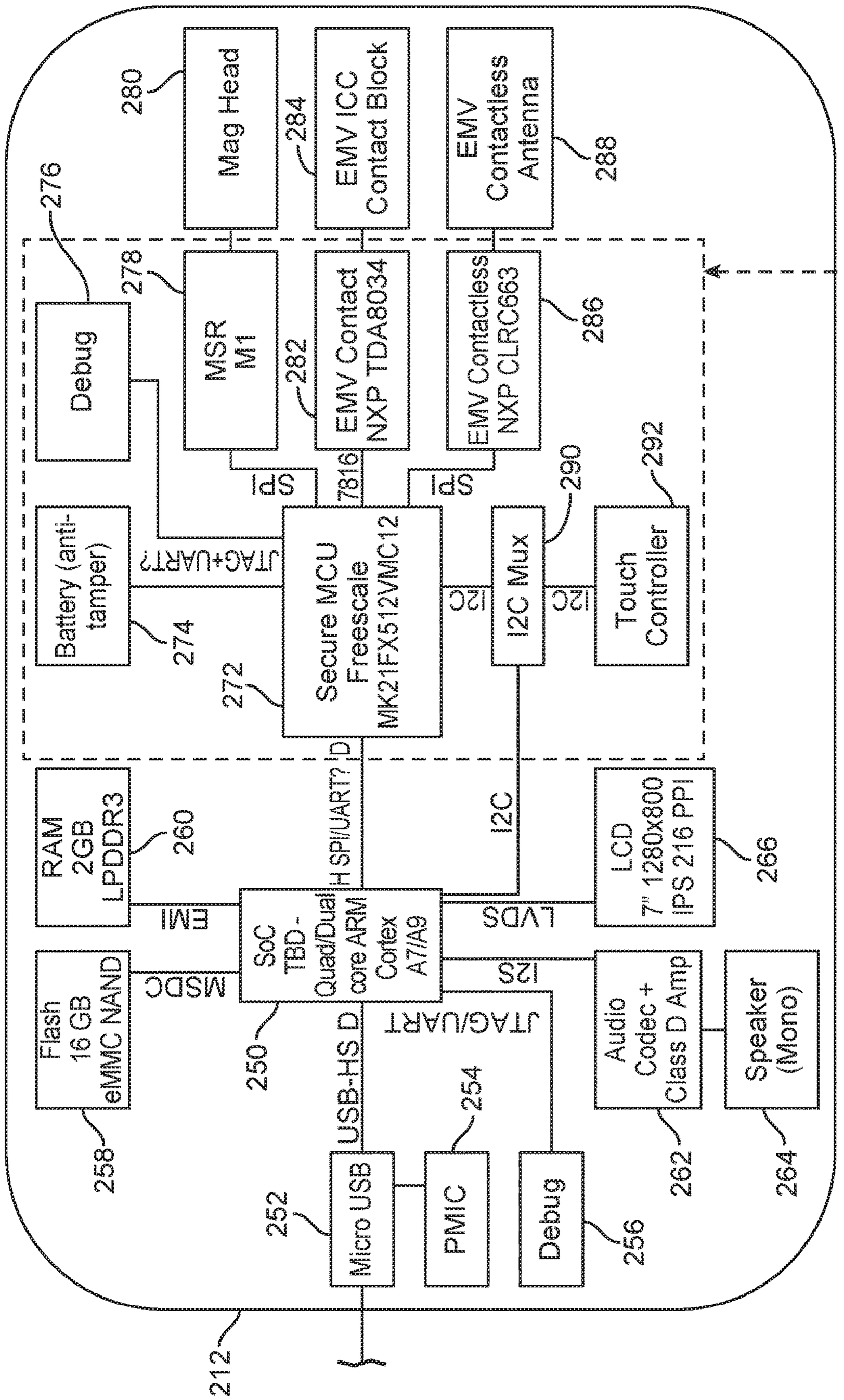

276
280
Mag Head
284
EMV ICC Contact Block
EMV Contactless Antenna
288
Debug
278
MSR M1
282
EMV Contact NXP TDA8034
EMV Contactless NXP CLRC663
286
270
Legend:
Secure Enclave
Battery (anti-tamper)
JTAG+UART?
274
272
Secure MCU Freescale MK21FX512VMC12
I2C
I2C Mux
290
Touch Controller
292
RAM 2GB LPDDR3
260
H SPI/UART?
I2C
LCD 7" 1280x800 IPS 216 PPI
266
eMMC
LVDS
Flash 16 GB eMMC NAND
MSDC
SoC TBD-Quad/Dual core ARM Cortex A7/A9
I2S
Audio Codec + Class D Amp
Speaker (Mono)
258
250
USB-HS D
JTAG/UART
262
264
252
Micro USB
PMIC
254
Debug
256
212

FIG. 2 (Cont.)

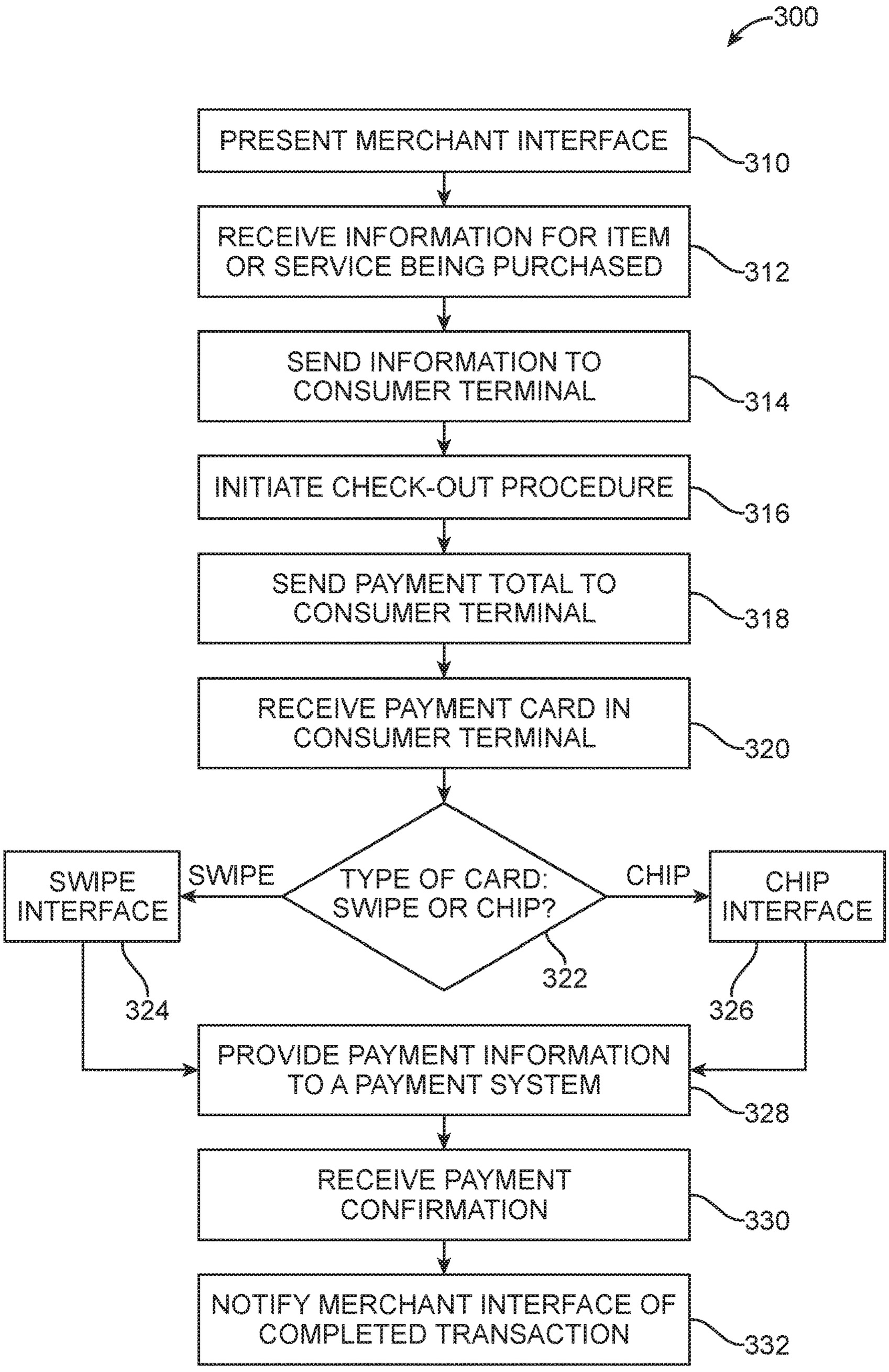

300
PRESENT MERCHANT INTERFACE
310
RECEIVE INFORMATION FOR ITEM OR SERVICE BEING PURCHASED
312
SEND INFORMATION TO CONSUMER TERMINAL
314
INITIATE CHECK-OUT PROCEDURE
316
SEND PAYMENT TOTAL TO CONSUMER TERMINAL
318
RECEIVE PAYMENT CARD IN CONSUMER TERMINAL
320
TYPE OF CARD: SWIPE OR CHIP?
322
SWIPE
CHIP
SWIPE INTERFACE
CHIP INTERFACE
324
326
PROVIDE PAYMENT INFORMATION TO A PAYMENT SYSTEM
328
RECEIVE PAYMENT CONFIRMATION
330
NOTIFY MERCHANT INTERFACE OF COMPLETED TRANSACTION
332

FIG. 3

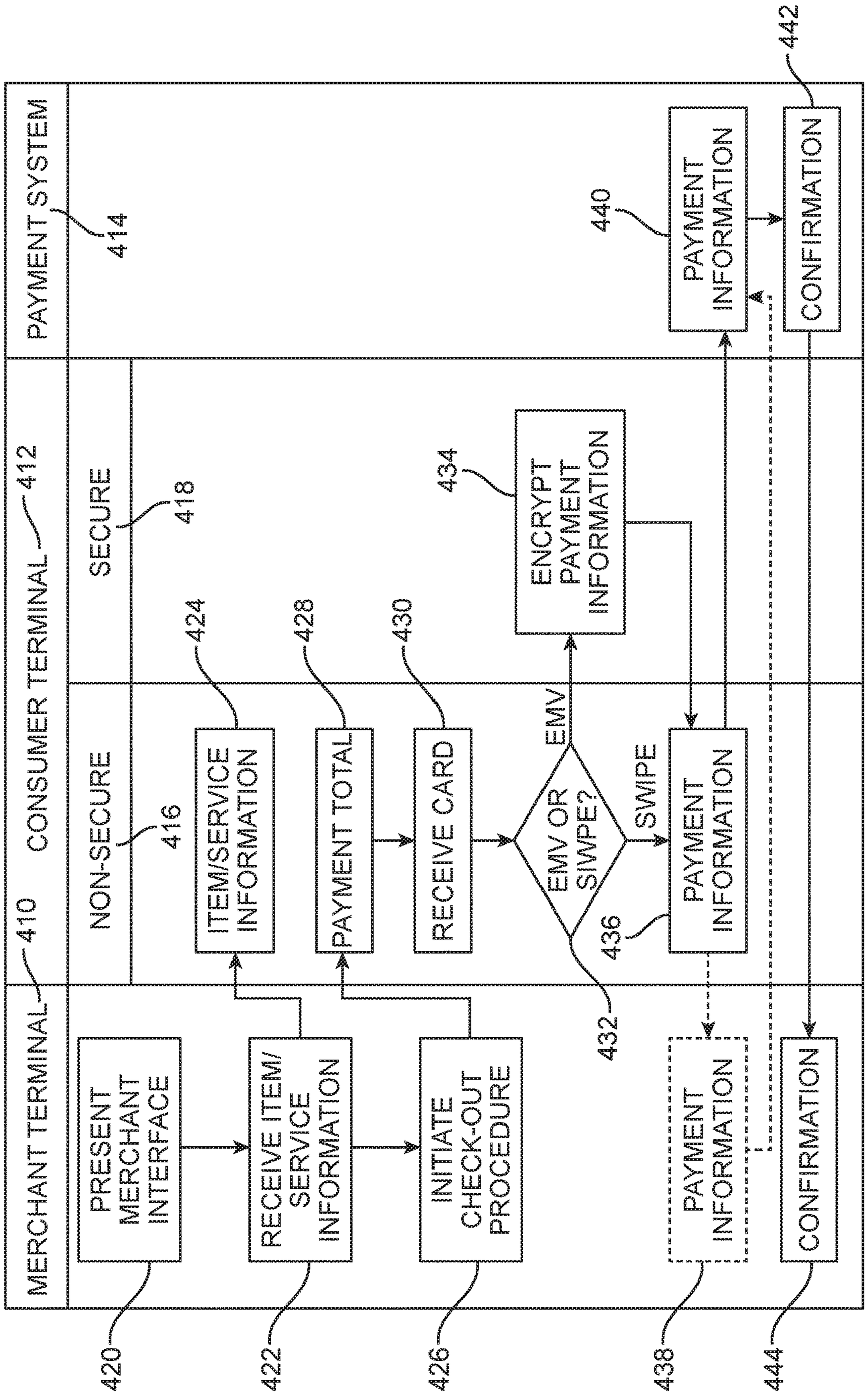

PAYMENT SYSTEM
414
440
PAYMENT INFORMATION
442
CONFIRMATION
CONSUMER TERMINAL
412
410
SECURE
418
NON-SECURE
416
424
ITEM/SERVICE INFORMATION
428
PAYMENT TOTAL
430
RECEIVE CARD
434
ENCRYPT PAYMENT INFORMATION
EMV
EMV OR SIWPE?
SWIPE
436
PAYMENT INFORMATION
432
MERCHANT TERMINAL
PRESENT MERCHANT INTERFACE
RECEIVE ITEM/ SERVICE INFORMATION
INITIATE CHECK-OUT PROCEDURE
PAYMENT INFORMATION
CONFIRMATION
420
422
426
438
444

FIG. 4

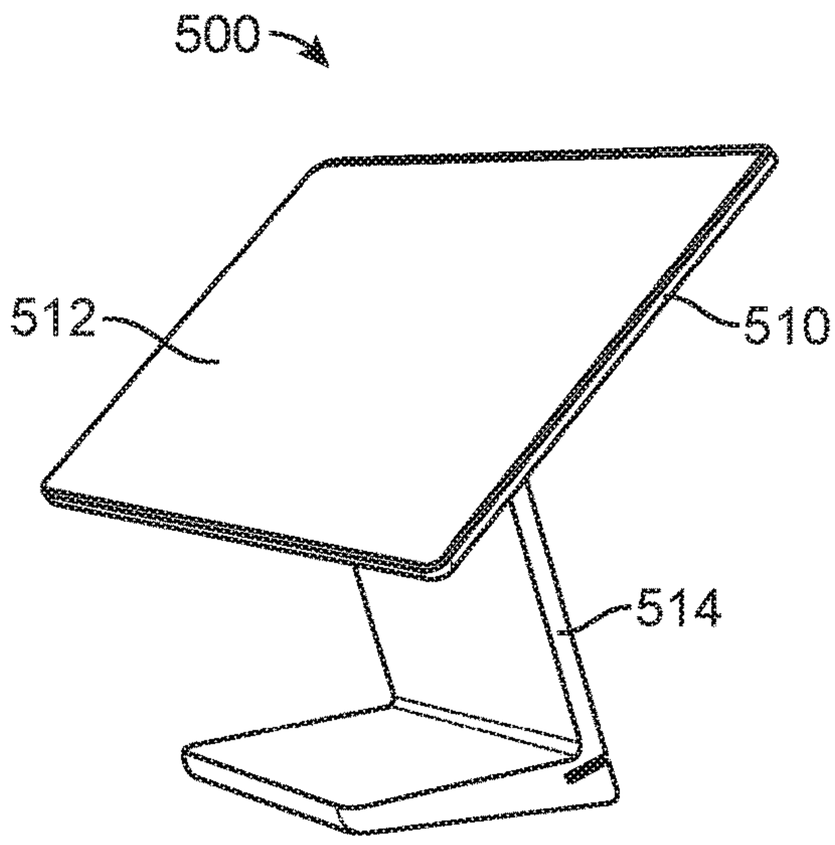


FIG. 5

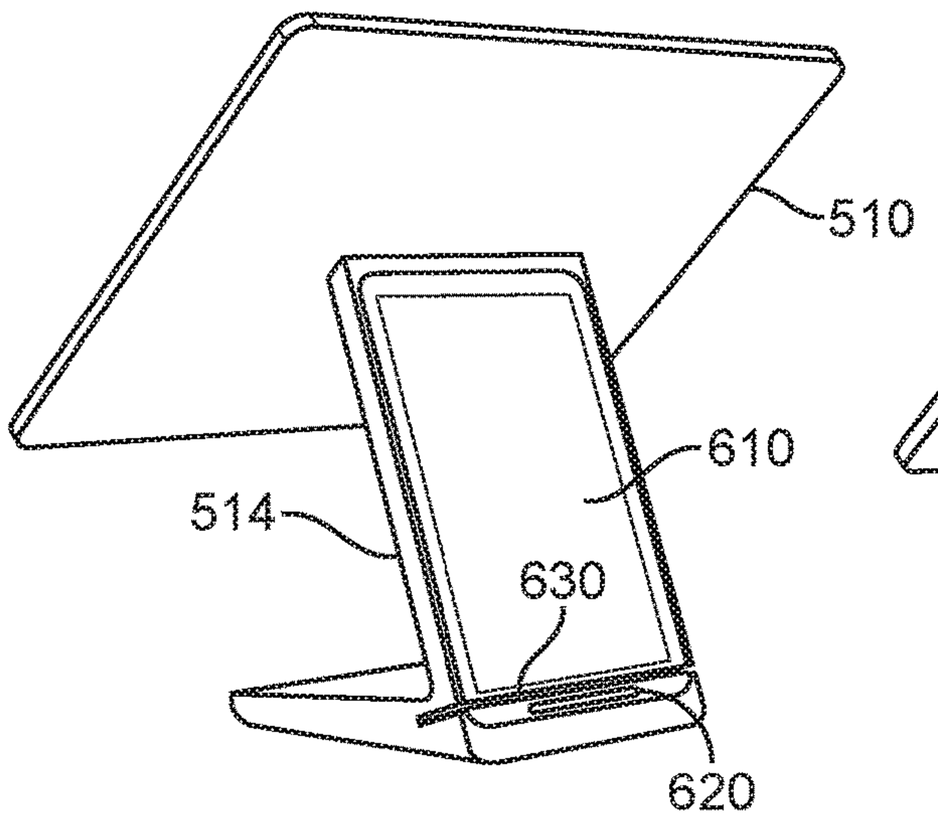


FIG. 6

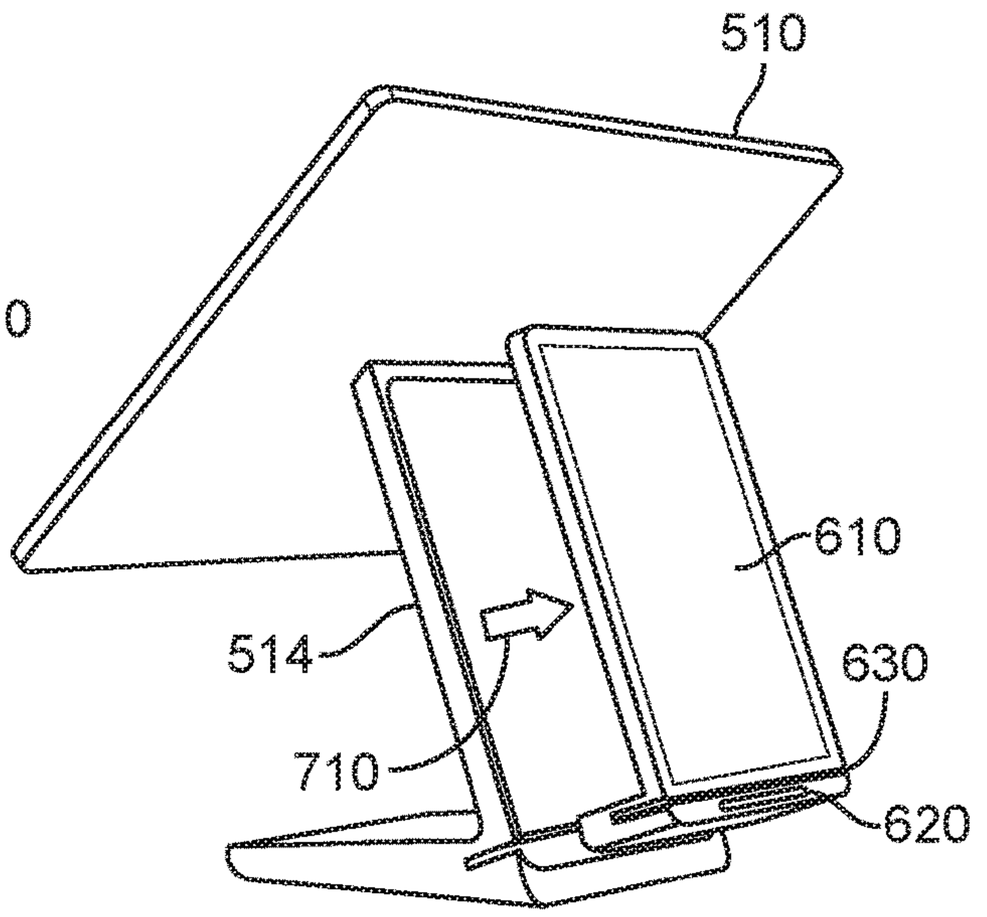


FIG. 7

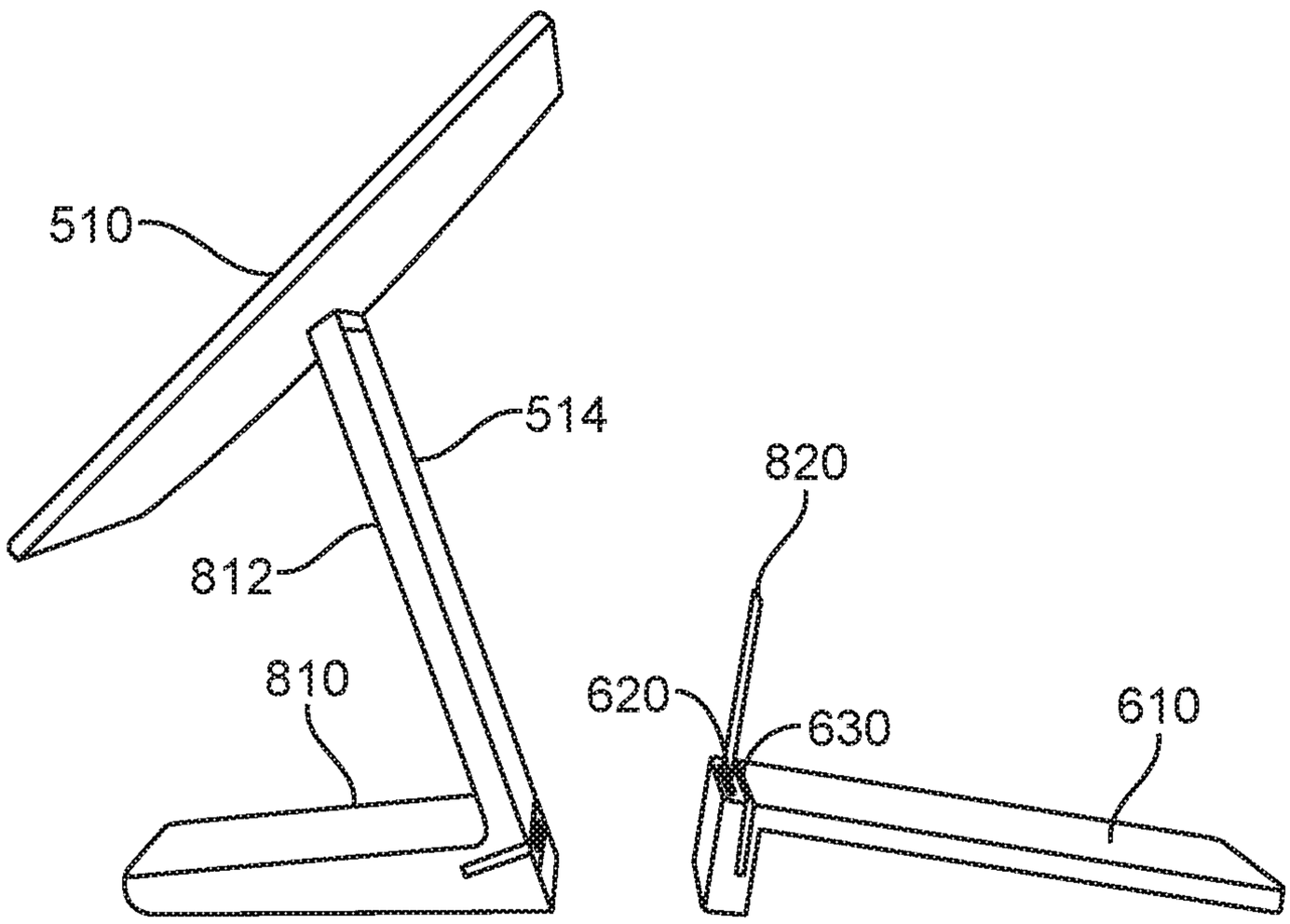


FIG. 8

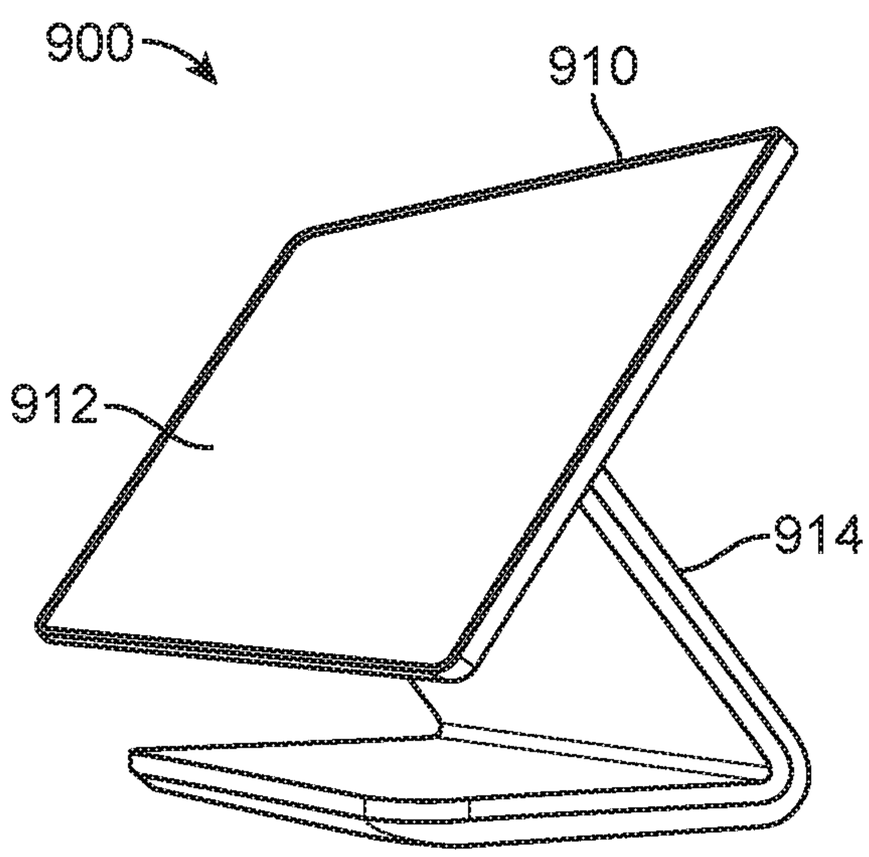


FIG. 9

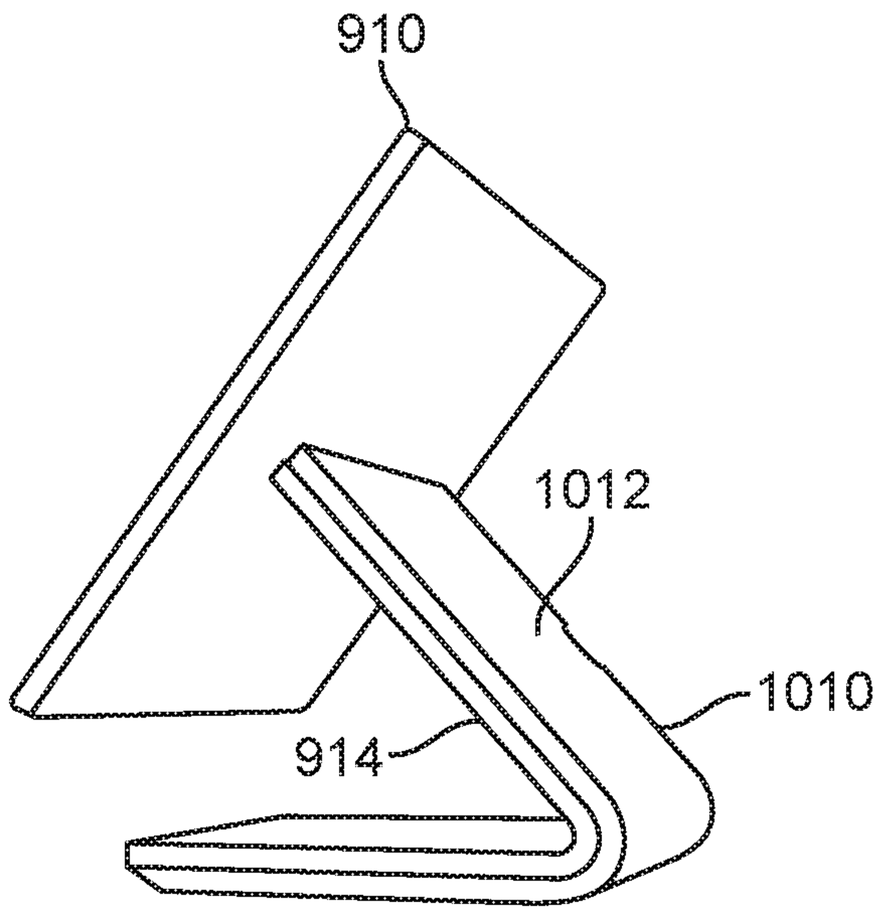


FIG. 10

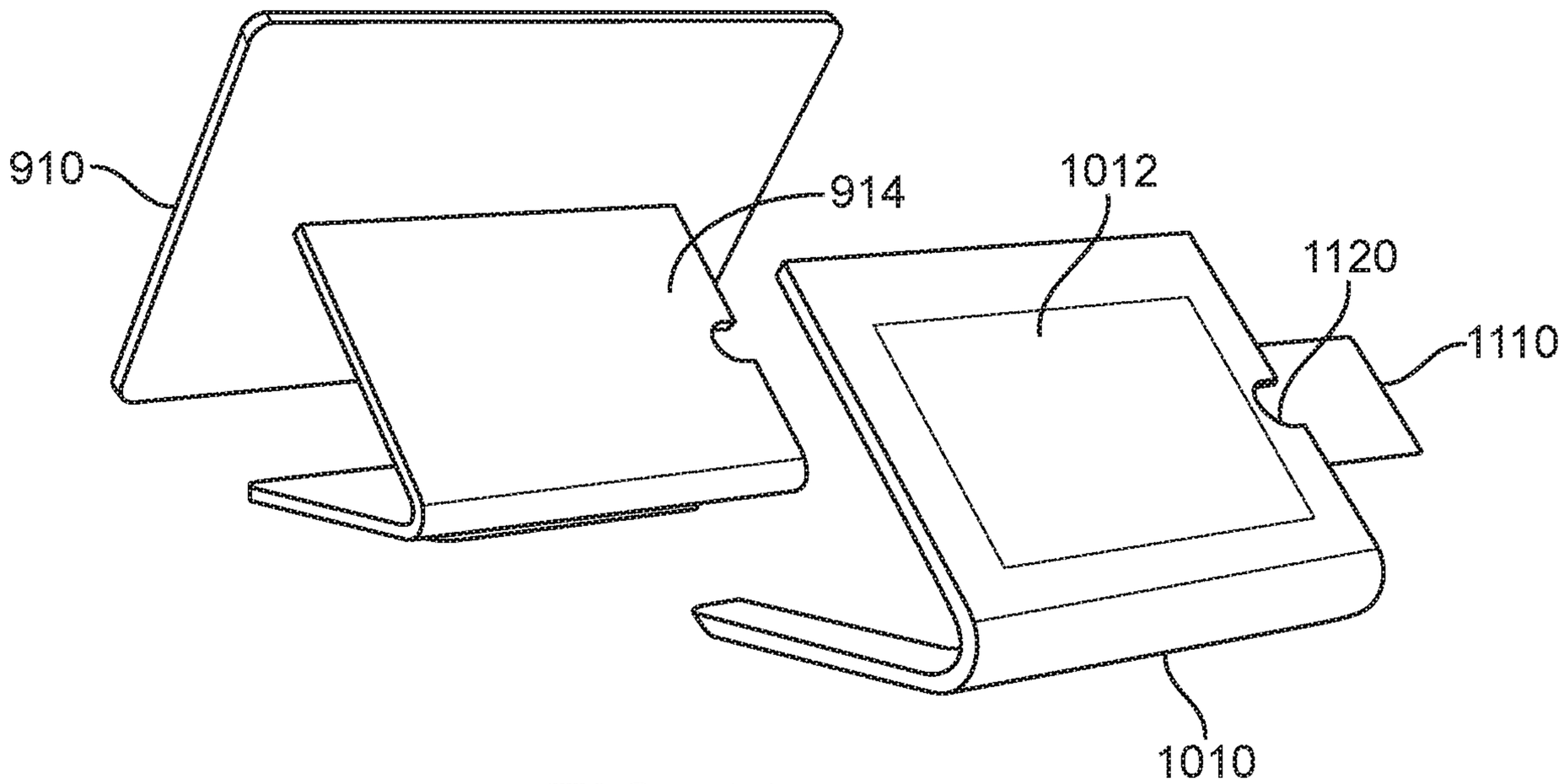

910
914
1012
1120
1110
1010

FIG. 11

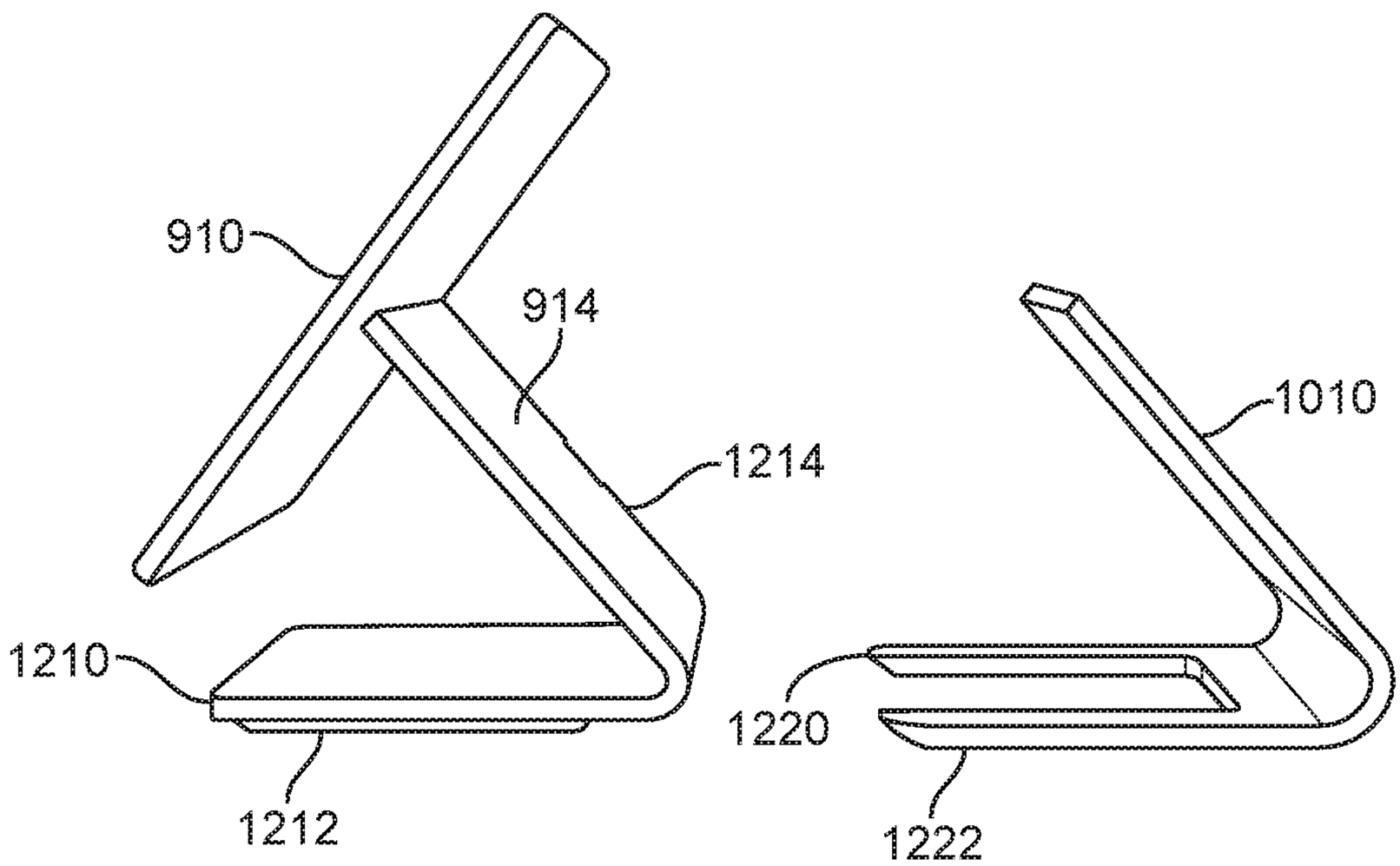

910
914
1214
1210
1212
1010
1220
1222

FIG. 12

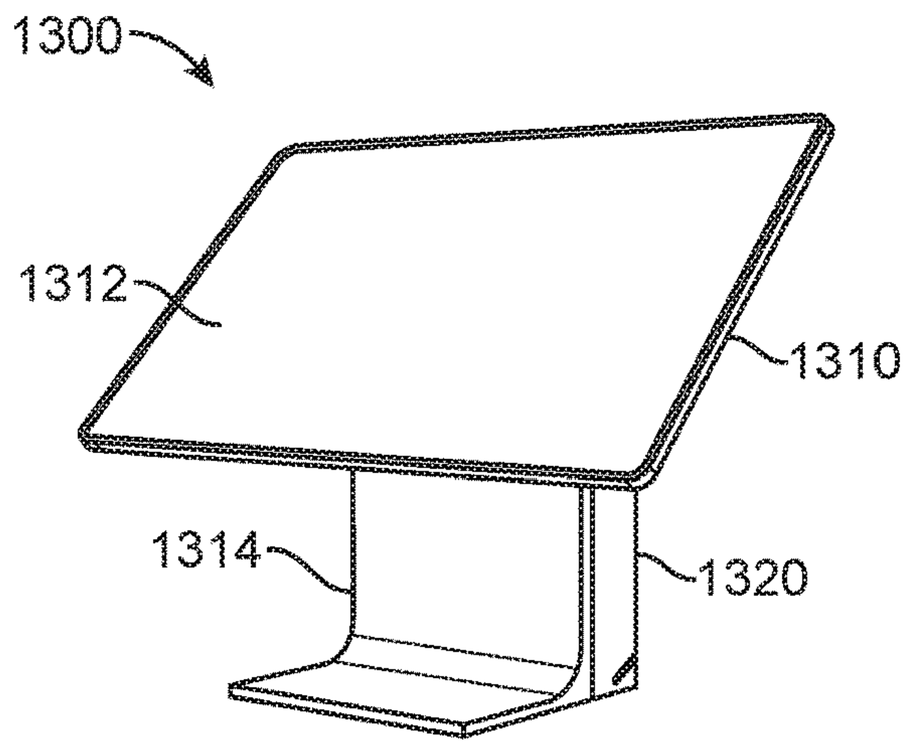


FIG. 13

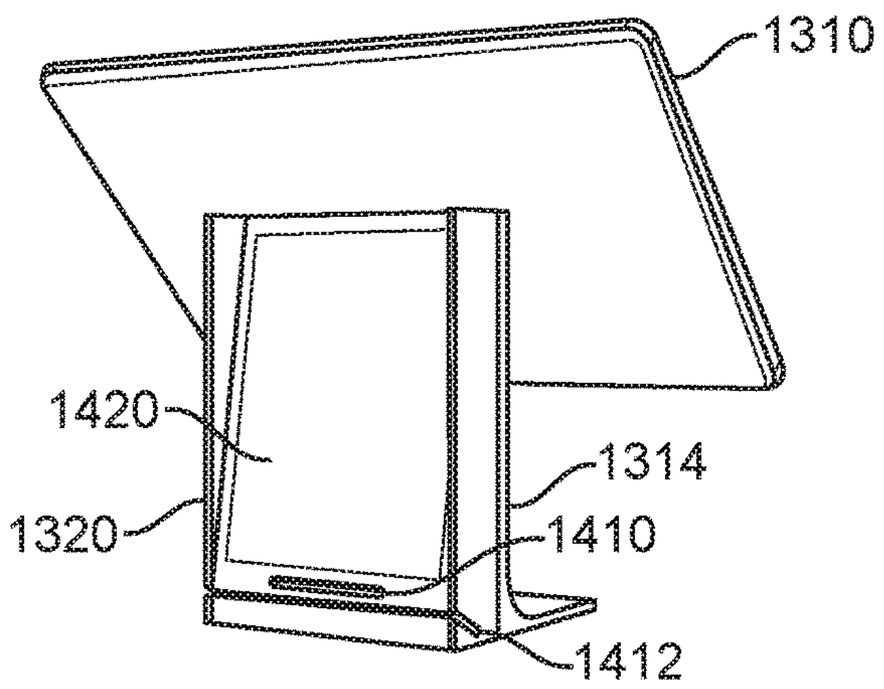
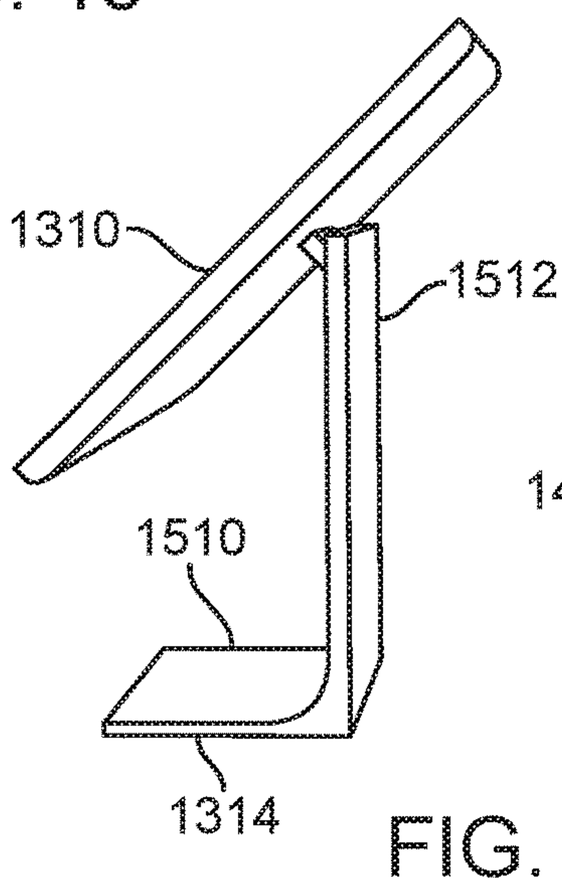


FIG. 14



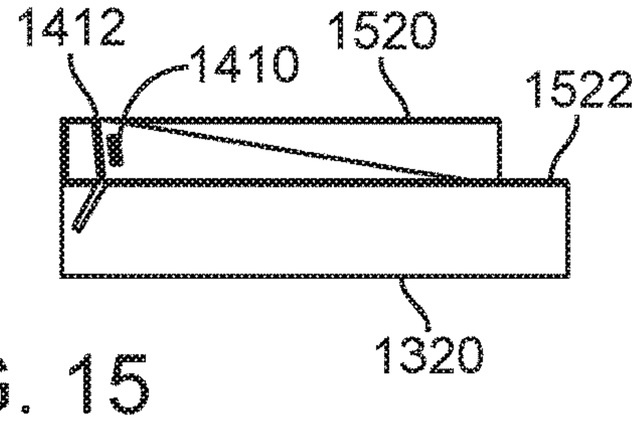


FIG. 15

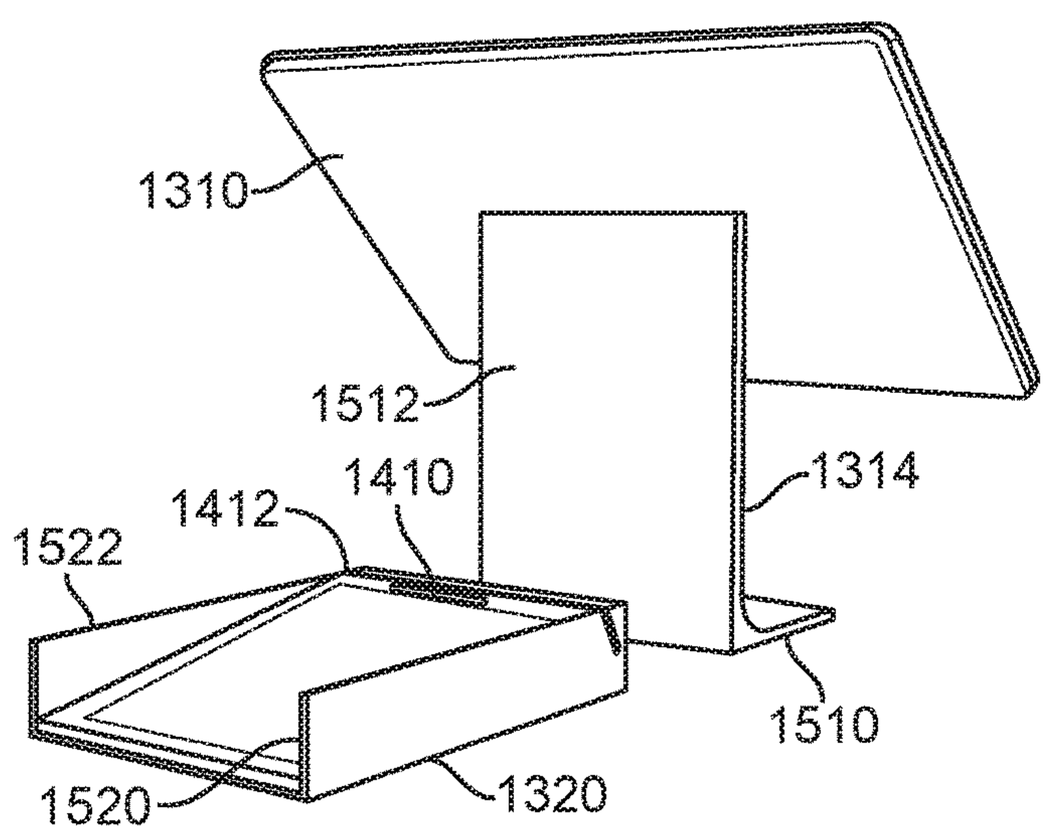


FIG. 16

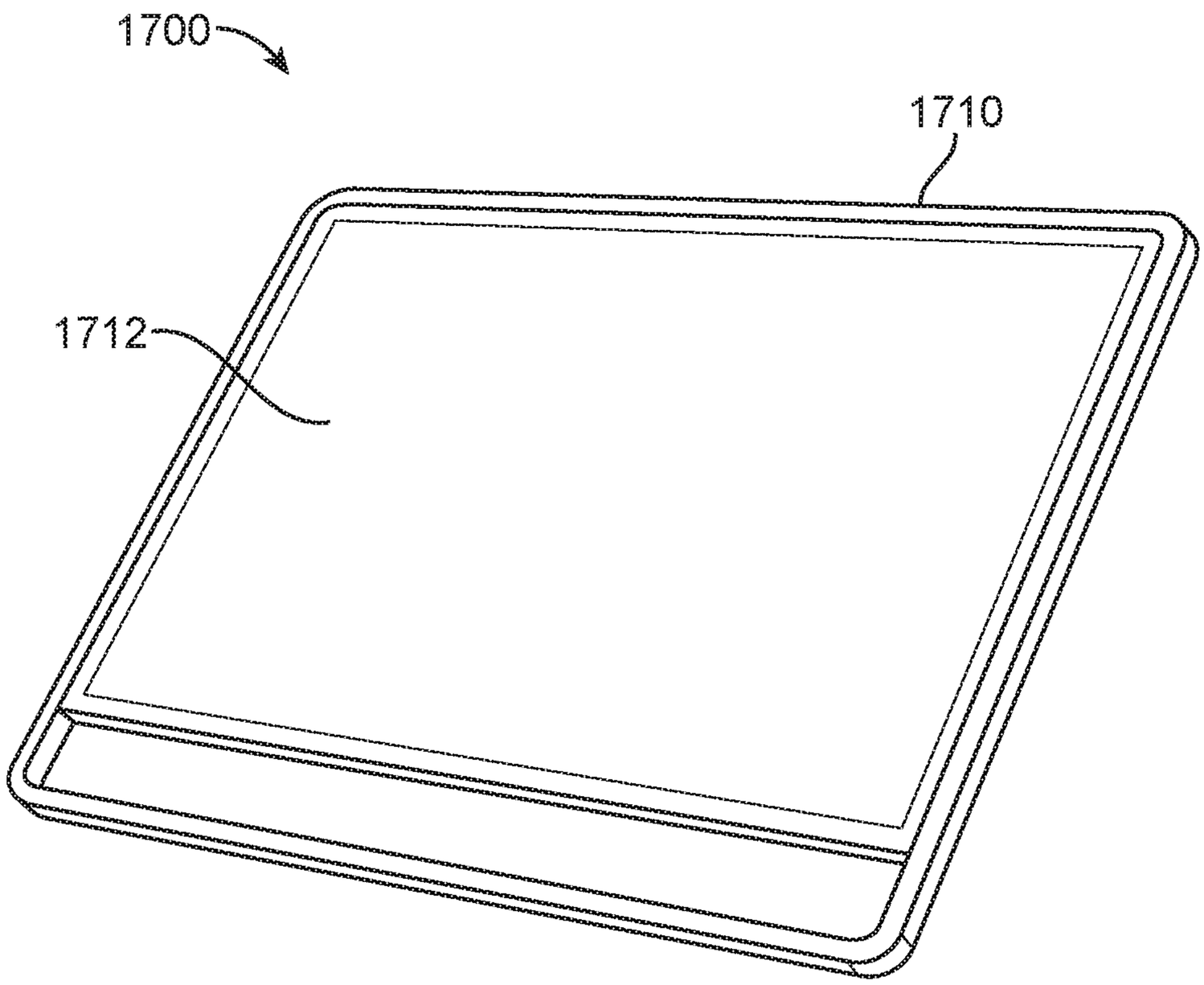


FIG. 17

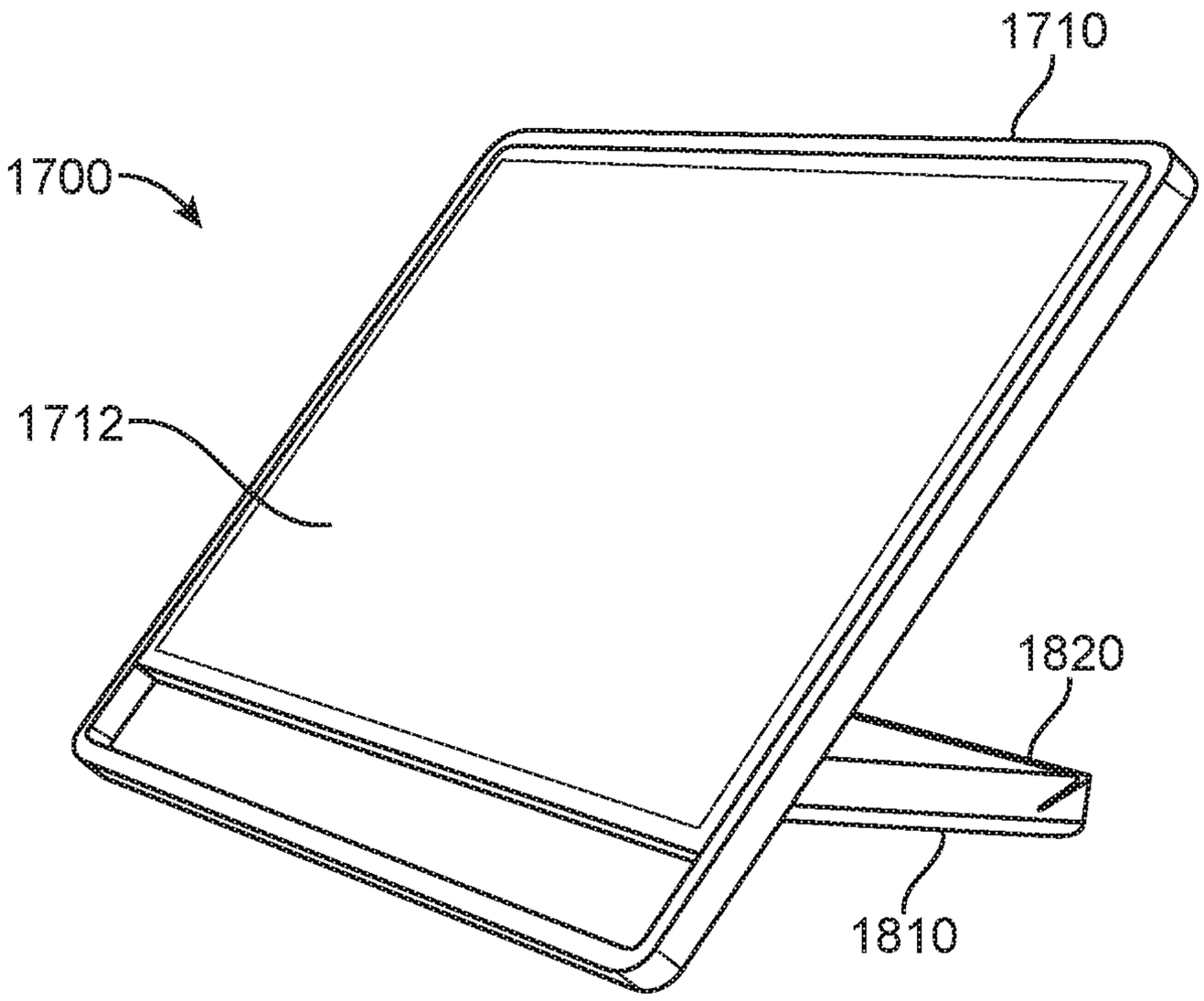


FIG. 18

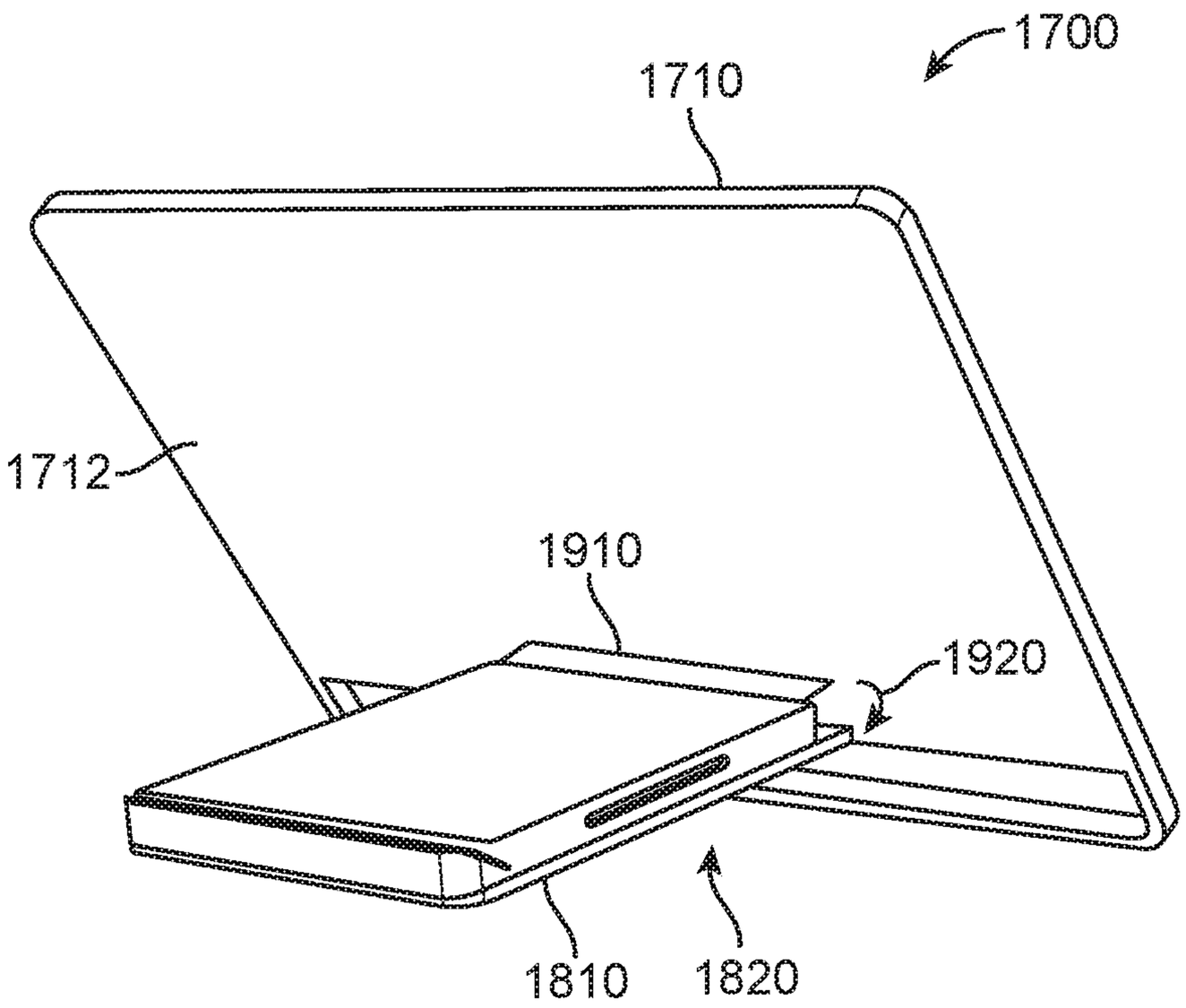

1700
1710
1712
1910
1920
1810
1820

FIG. 19

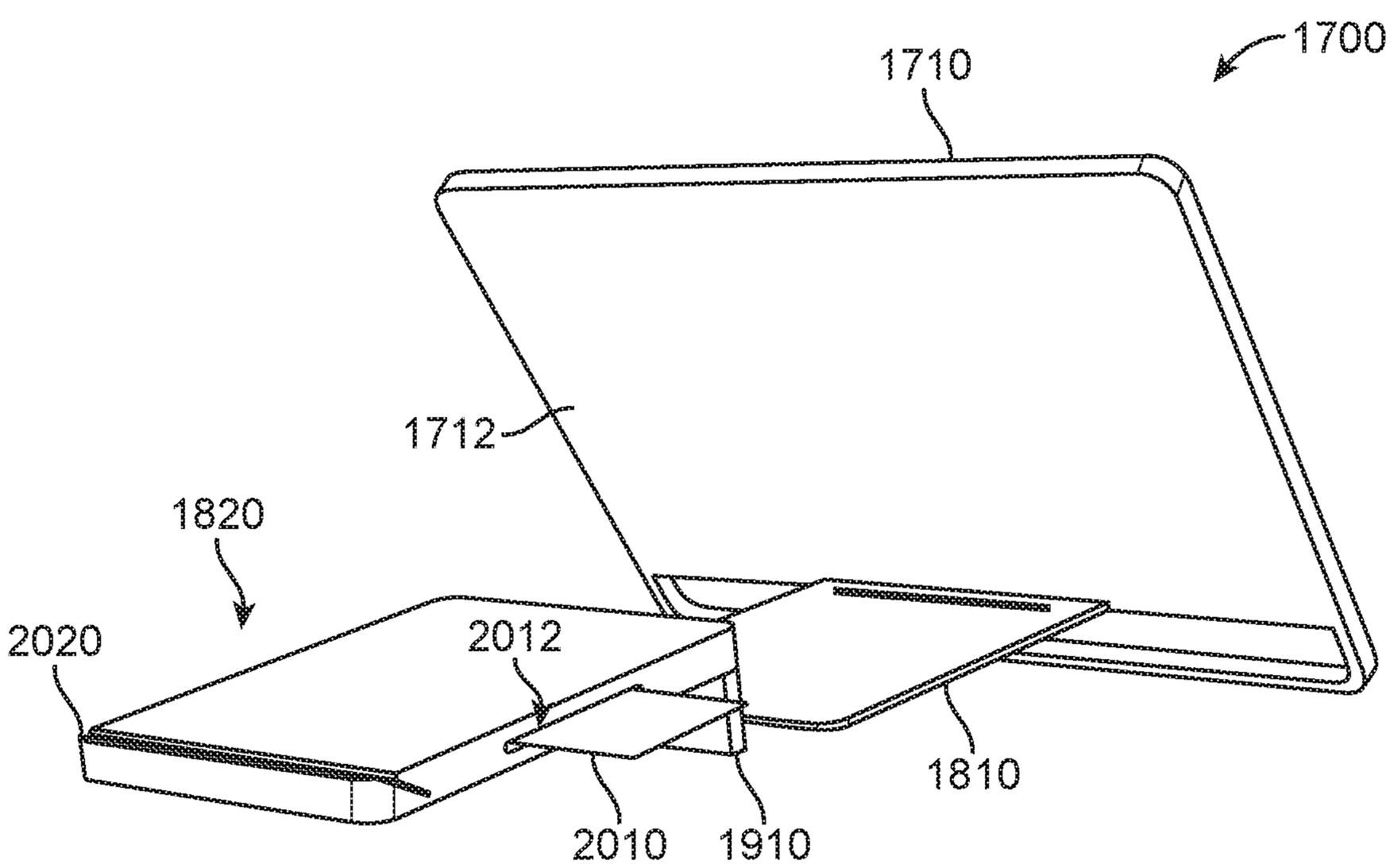

1700
1710
1712
1820
2020
2012
1810
2010
1910

FIG. 20

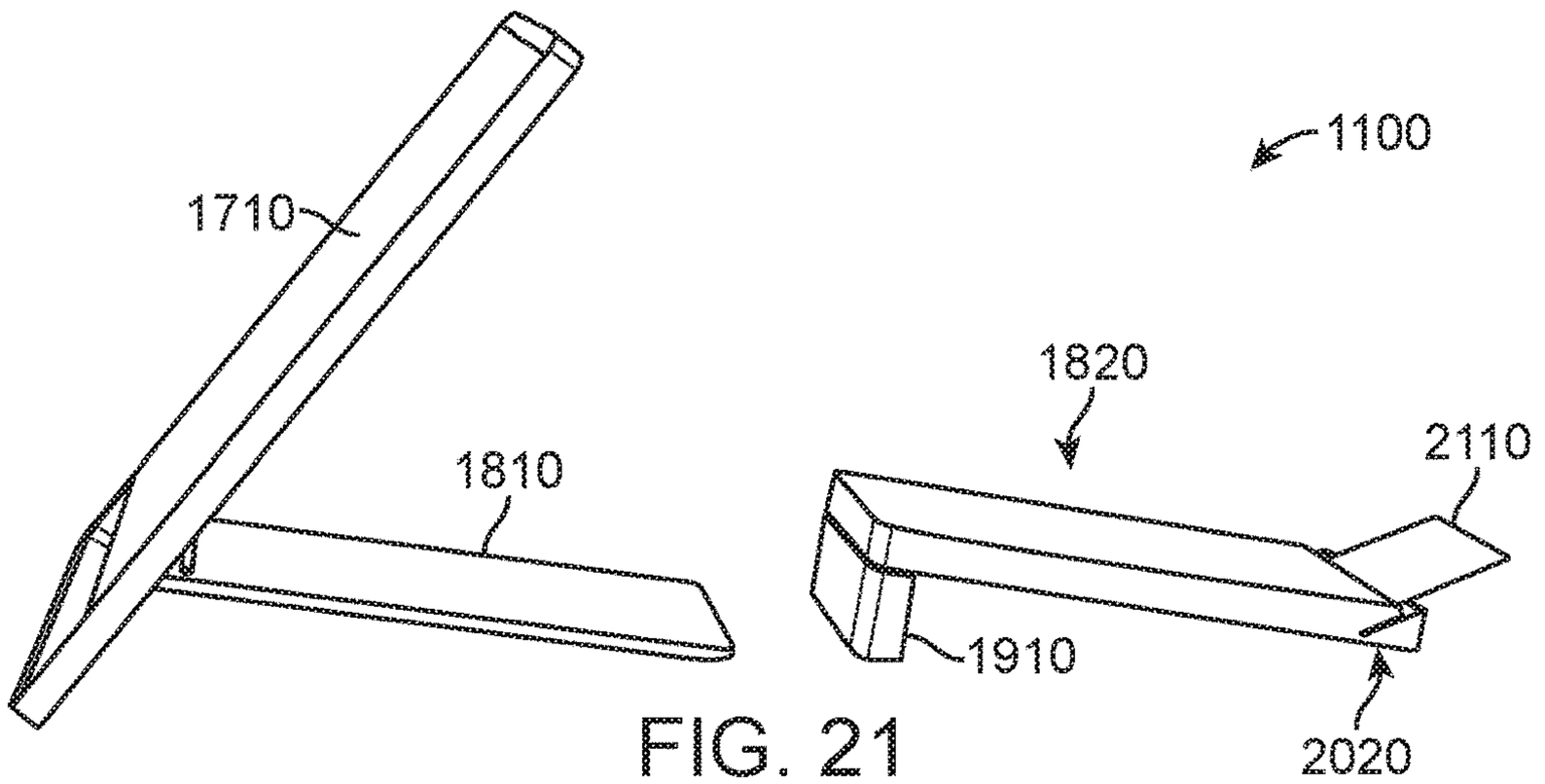


FIG. 21

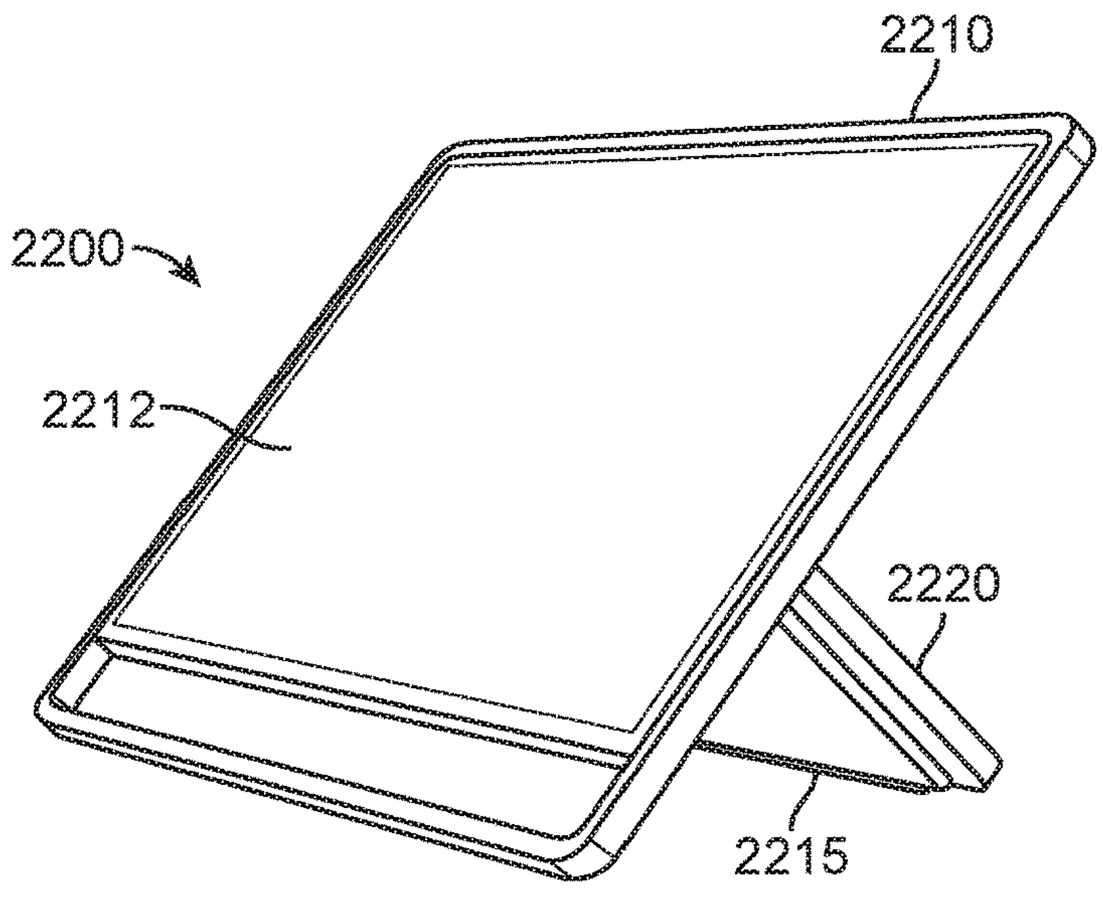


FIG. 22

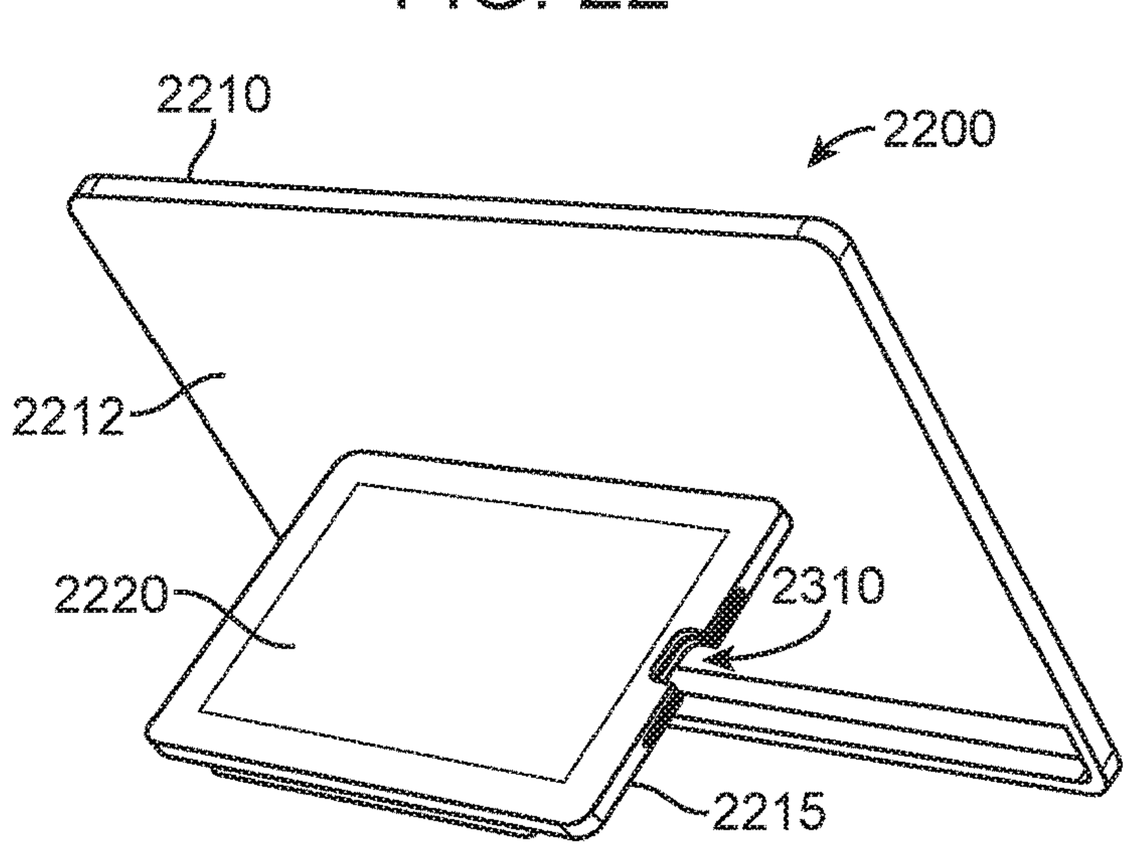


FIG. 23

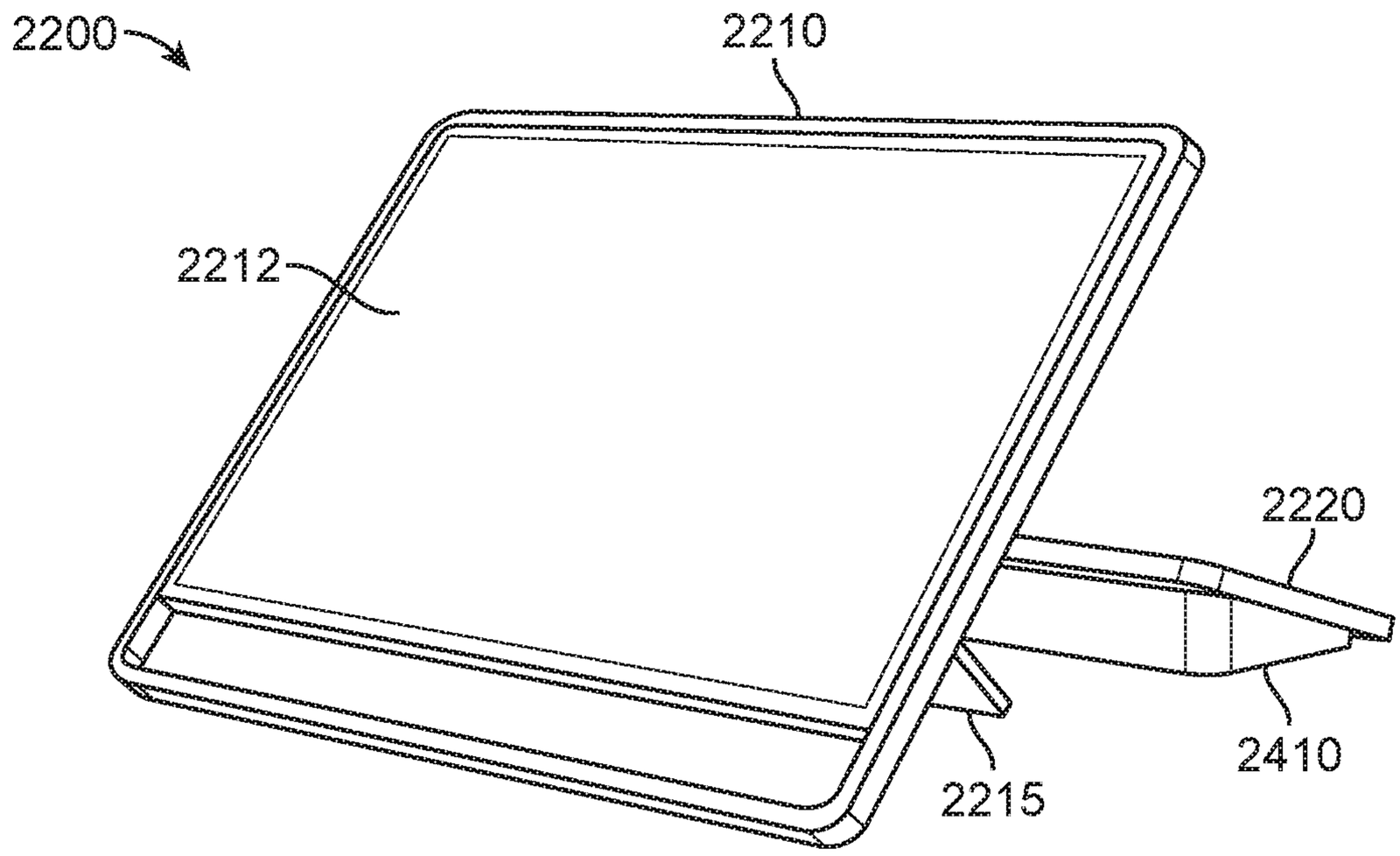


FIG. 24

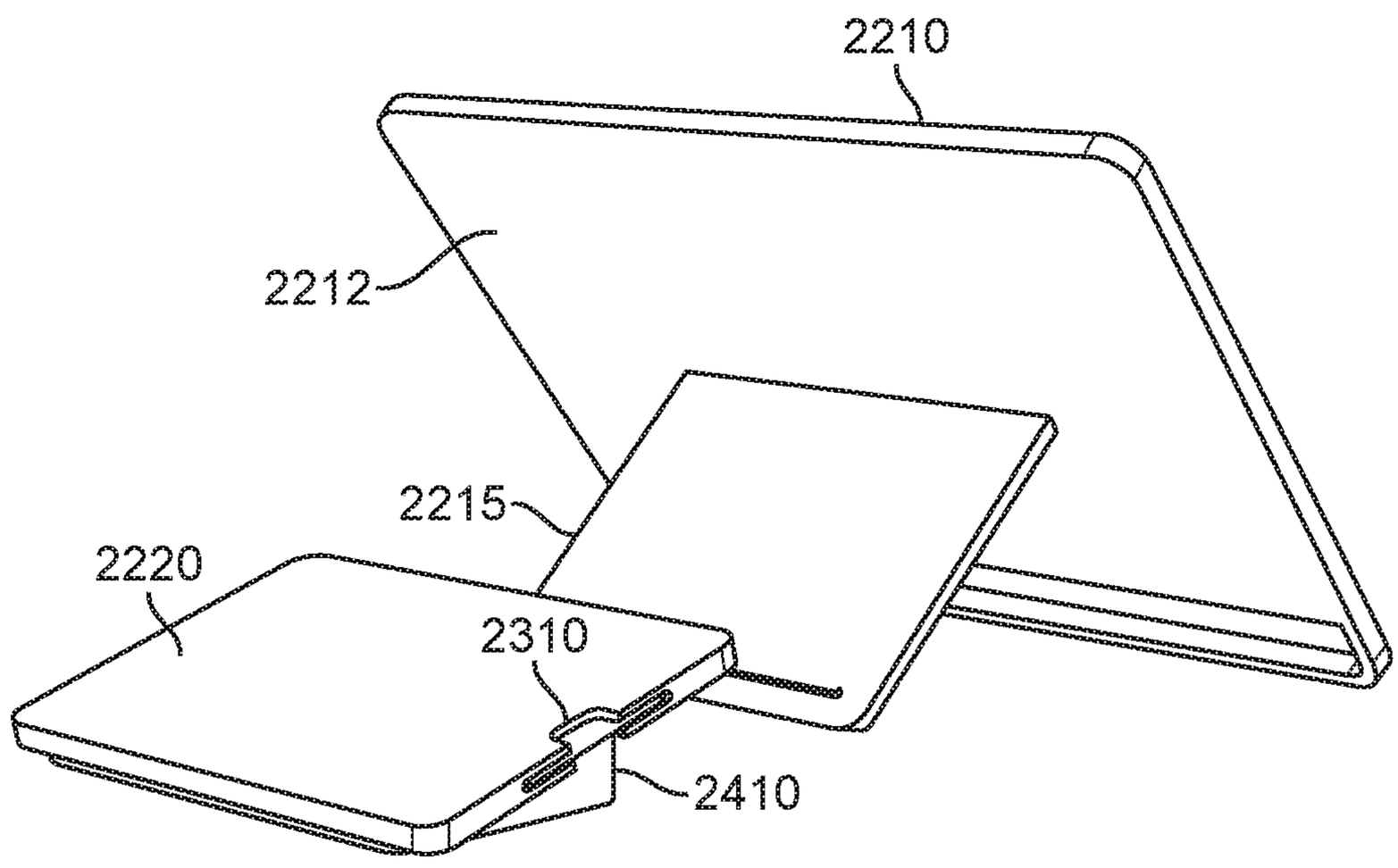


FIG. 25

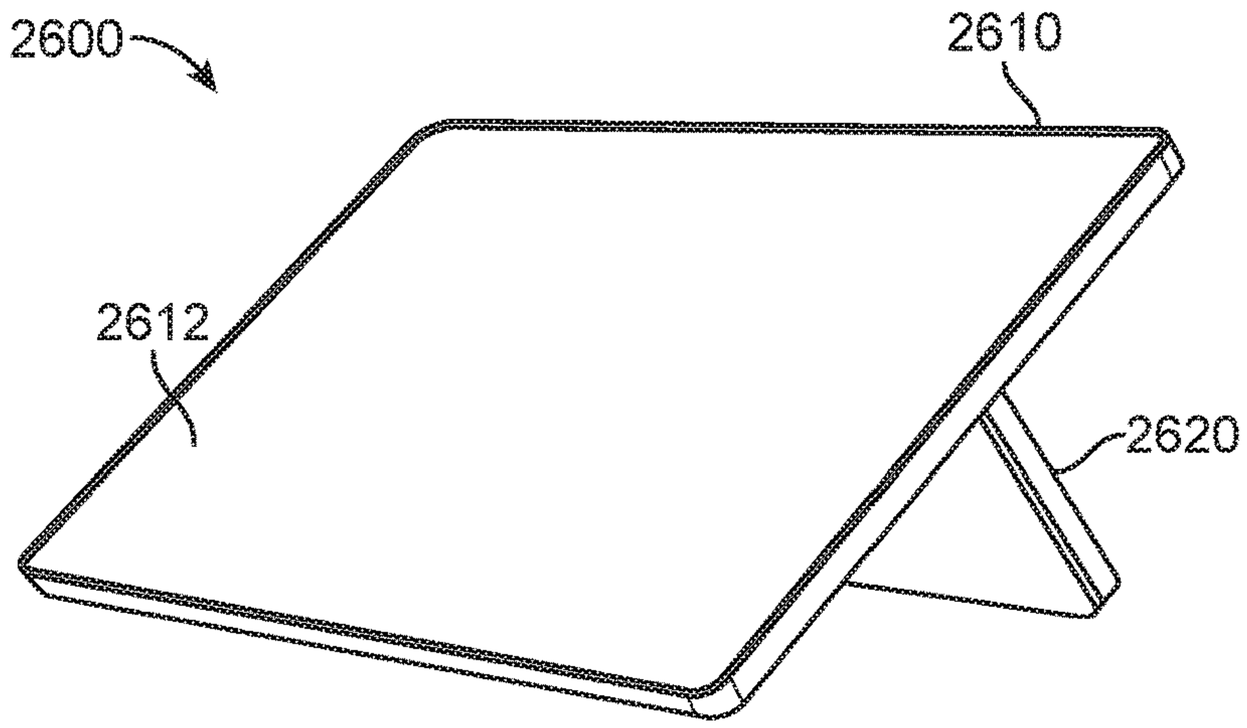


FIG. 26

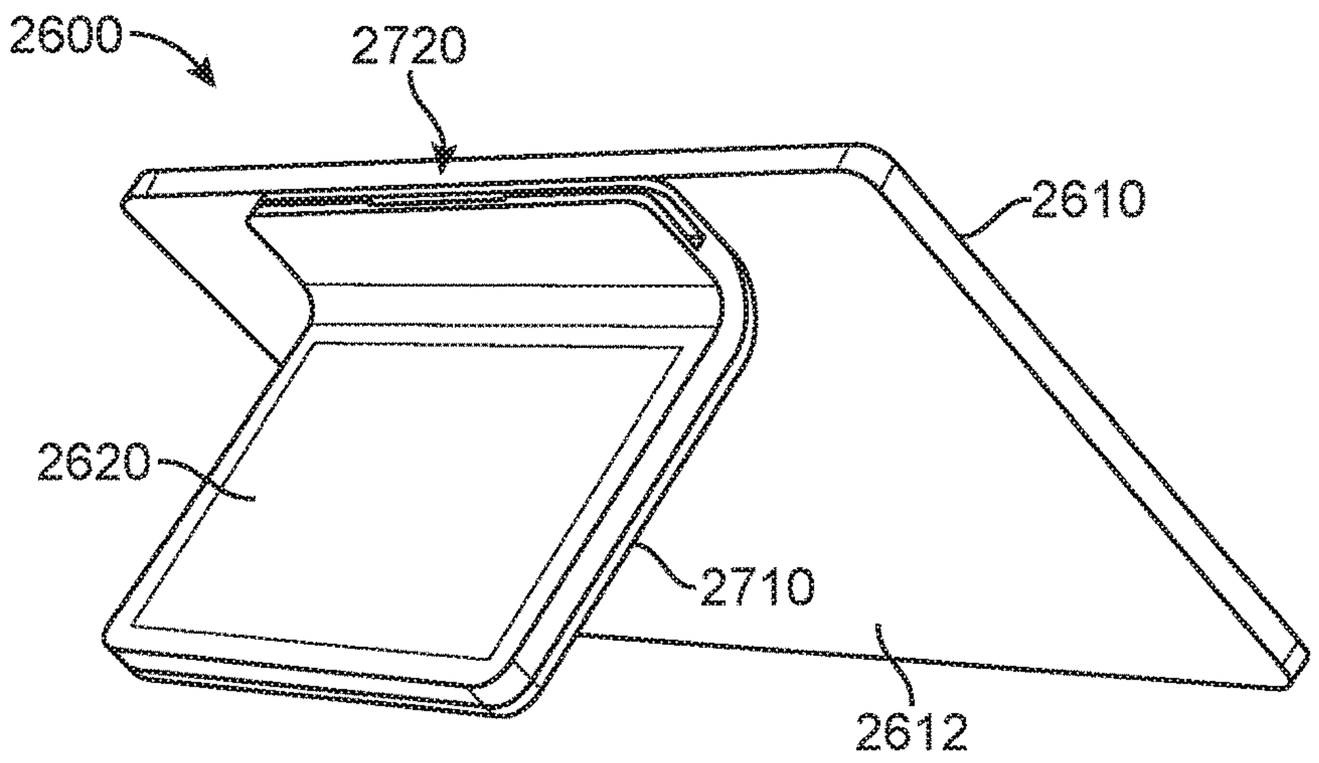


FIG. 27

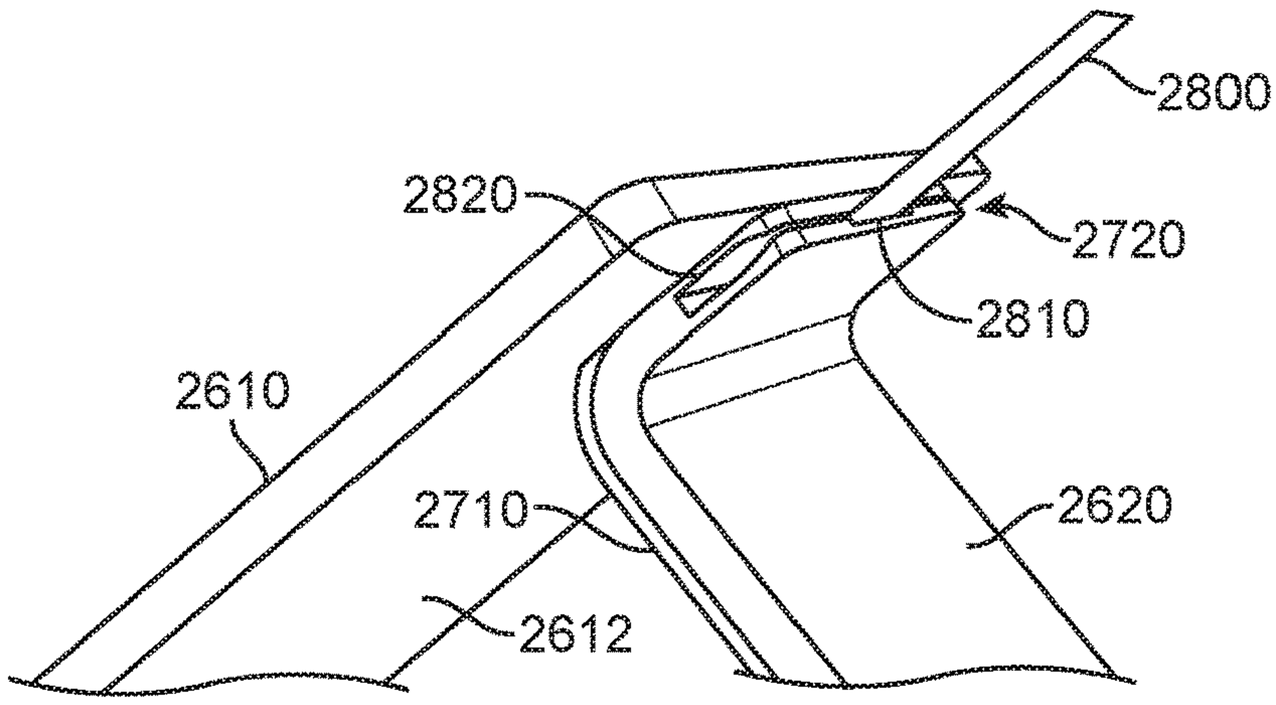


FIG. 28

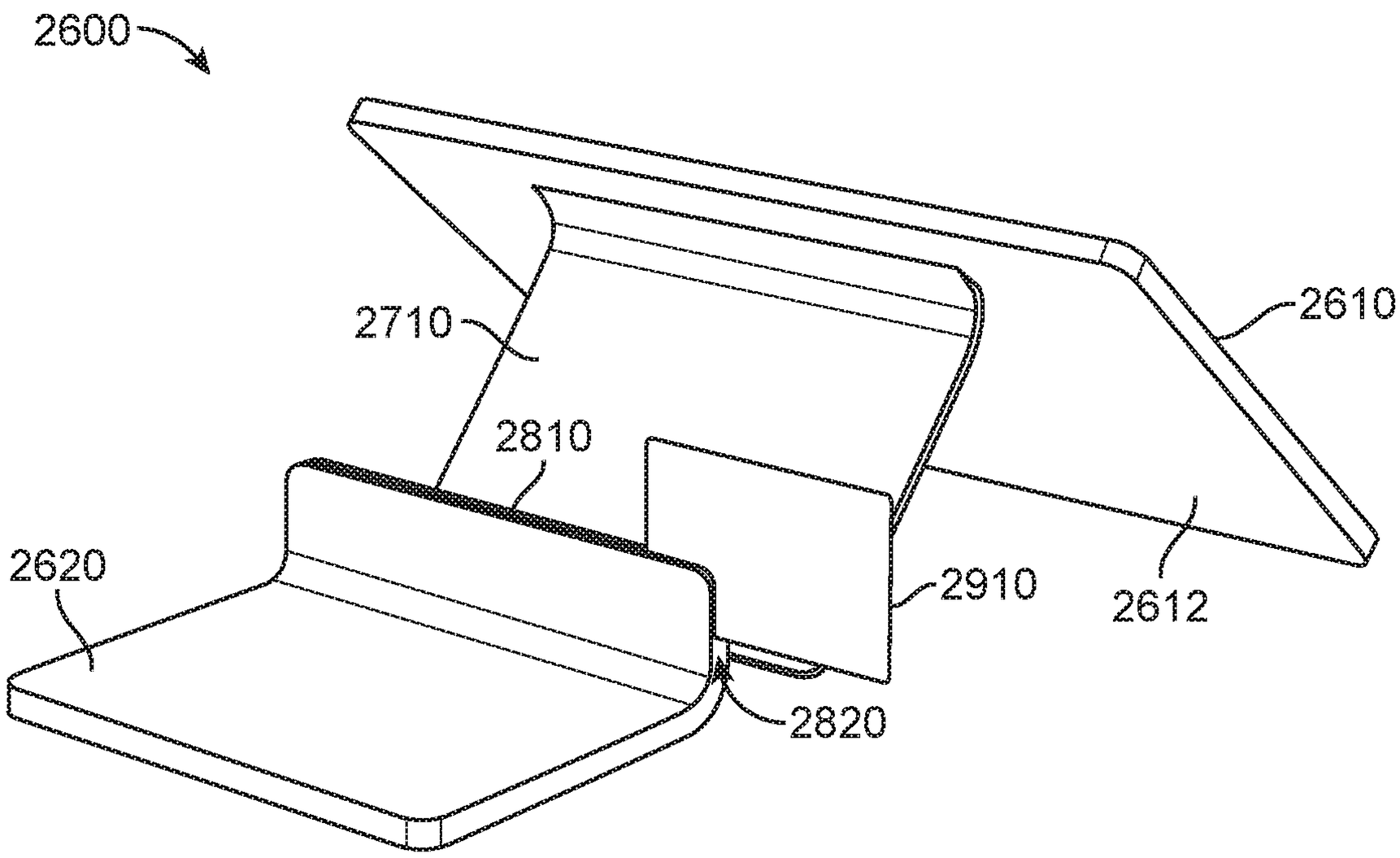

2600
2710
2610
2810
2620
2910
2612
2820

FIG. 29

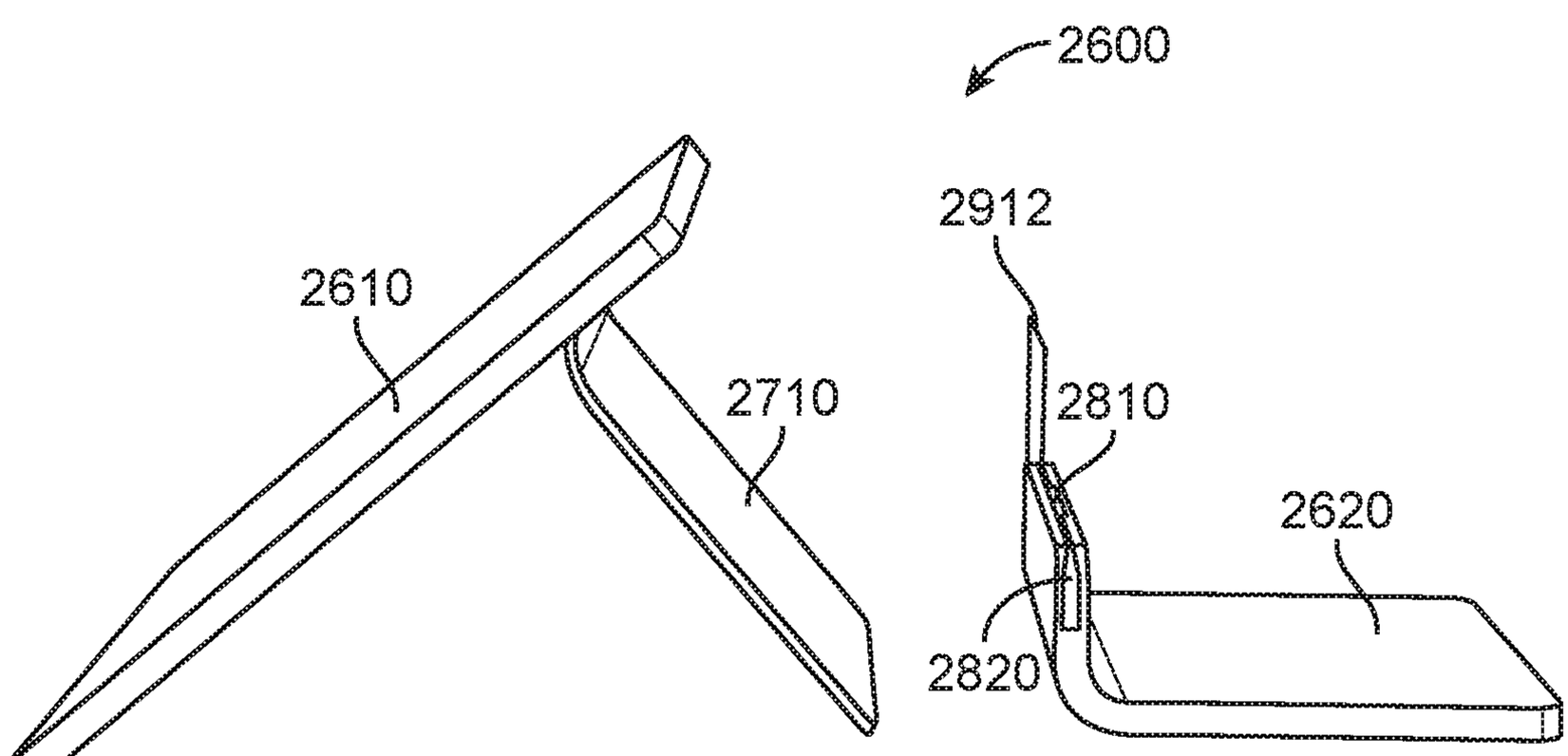

2600
2610
2710
2912
2810
2620
2820

FIG. 30

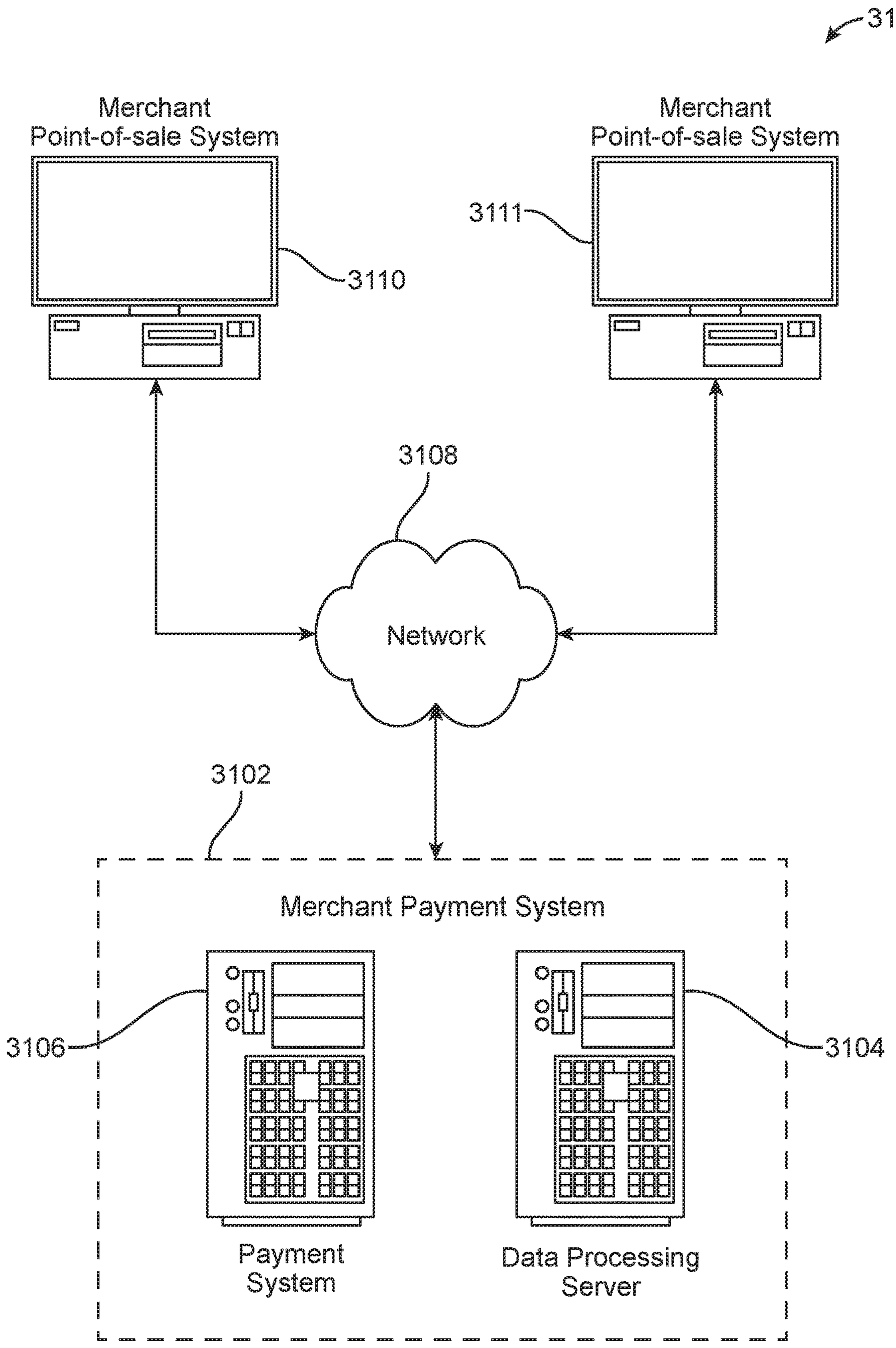

3100
Merchant
Point-of-sale System
3110
3111
Merchant
Point-of-sale System
3108
Network
3102
Merchant Payment System
3106
Payment
System
Data Processing
Server
3104

FIG. 31

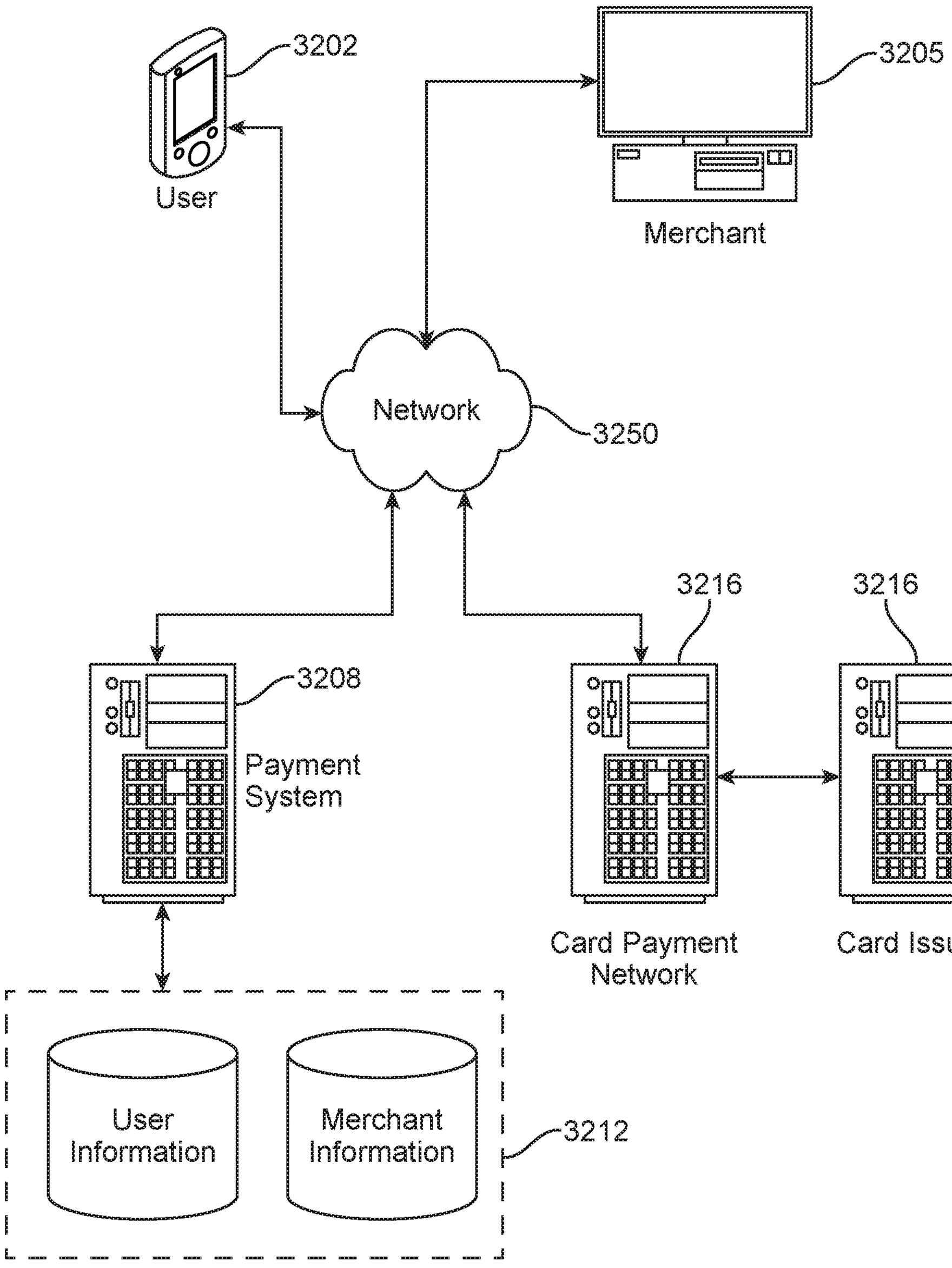

3202
User
3205
Merchant
Network
3250
3216
3216
3208
Payment System
Card Payment Network
Card Issuer
User Information
Merchant Information
3212

FIG. 32

POINT OF SALE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 14/592,255, entitled, "POINT OF SALE SYSTEM", filed on Jan. 8, 2015, which claims the benefit of U.S. Provisional Patent Application No. 62/053,029, entitled "POINT OF SALE SYSTEM", filed on Sep. 19, 2014; both of which are hereby expressly incorporated herein by reference in their entireties.

BACKGROUND

Consumers can interact with merchants to conduct various financial payment transactions. For example, a consumer can conduct a transaction with a merchant at a point-of-sale system using cash, a transaction card, or other transaction instrument. Conventional systems can include expensive and bulky specialized equipment and financial transaction electronics, as may include a card reader for payment cards (e.g., debit or credit cards), a cash drawer, monitors, keyboards, and various other electronic devices. Oftentimes, however, this equipment can be costly and large, requiring additional space and resources. Further, in retail stores where space is limited, a merchant may not require all components that come with a conventional point-of-sale system or at least may find it desirable to piece together a modular or mobile system to streamline the checkout experience. Further still, merchants may find approaches to conducting a financial transaction using conventional systems burdensome, where during a transaction, if a customer pays by credit card, the merchant has to enter a transaction amount and the merchant or the customer has to swipe the credit card in the card reader. Further, many transactions require that the customer sign a physical receipt, electronically approve a transaction, e.g., by pressing an approve button on a user interface, electronically sign for the transaction, e.g., with a stylus or finger on an electronic signature capture device with a touch sensitive pad, or enter an authorizing personal identification number (PIN), many of which techniques require additional financial transaction electronics and time.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to describe the manner in which features of the disclosure can be obtained, a more particular description of the principles will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. Understanding that these drawings depict only exemplary embodiments of the disclosure and are not therefore to be considered to be limiting of its scope, the principles herein are described and explained with additional specificity and detail through the use of the accompanying drawings in which:

FIG. **1** illustrates an example block diagram showing a first terminal and a second terminal used in a point-of-sale system in accordance with various embodiments;

FIG. **2** illustrates an example schematic diagram of components of each terminal in the point-of-sale system in accordance with an embodiment;

FIG. **3** illustrates an example process for conducting a financial payment transaction in accordance with various embodiments;

FIG. **4** illustrates an example diagram of flow of data between the components of the point-of-sale system in accordance with an embodiment;

FIG. **5** illustrates an example point-of-sale system as viewed from a front perspective view, including a first terminal and a second terminal that are detachably mated together and shown in a fixed position, in accordance with an embodiment;

FIG. **6** illustrates the example point-of-sale system of FIG. **5** as viewed from a back perspective view, in accordance with an embodiment;

FIG. **7** illustrates the example point-of-sale system of FIG. **5** as viewed from the back perspective view, and showing the second terminal being separated from the first terminal, in accordance with an embodiment;

FIG. **8** illustrates the example point-of-sale system of FIG. **5** as viewed from a side perspective view and showing the second terminal completely separated from the first terminal, in accordance with an embodiment;

FIG. **9** illustrates another example point-of-sale system as viewed from a front perspective view, including a first terminal and a second terminal that are detachably mated together and shown in a fixed position, in accordance with an embodiment;

FIG. **10** illustrates the example point-of-sale system of FIG. **9** as viewed from a back perspective view, in accordance with an embodiment;

FIG. **11** illustrates the example point-of-sale system of FIG. **9** as viewed from the back perspective view, and showing the second terminal being separated from the first terminal, in accordance with an embodiment;

FIG. **12** illustrates the example point-of-sale system of FIG. **9** as viewed from a side perspective view and showing the second terminal completely separated from the first terminal with the point-of-sale system in a separated position, in accordance with an embodiment;

FIG. **13** illustrates another example point-of-sale system as viewed from a front perspective view, including a first terminal and a second terminal that are detachably mated together and shown in a fixed position, in accordance with an embodiment;

FIG. **14** illustrates the example point-of-sale system of FIG. **13** as viewed from a back perspective view, in accordance with an embodiment;

FIG. **15** illustrates the example point-of-sale system of FIG. **13** as viewed from a side perspective view and showing the second terminal completely independent from the first terminal, in a separated position in accordance with an embodiment;

FIG. **16** illustrates the example point-of-sale system of FIG. **13** as viewed from the back perspective view and showing the second terminal completely independent from the first terminal, in accordance with an embodiment;

FIG. **17** illustrates another example point-of-sale system as viewed from a front perspective view showing a first terminal and including a second terminal not visible in FIG. **17** that is detachably mated to the first terminal, in accordance with an embodiment;

FIG. **18** illustrates the example point-of-sale system of FIG. **17** as viewed from a side perspective view showing the first terminal with the second terminal detachably mated thereto, in accordance with an embodiment;

FIG. **19** illustrates the example point-of-sale system of FIG. **17** as viewed from a rear perspective view with the second terminal detachably mated to the first terminal, in accordance with an embodiment;

FIG. **20** illustrates the example point-of-sale system of FIG. **17** as viewed from a rear perspective view, with the second terminal separated from the first terminal in a separated position, in accordance with an embodiment;

FIG. **21** illustrates the example point-of-sale system of FIG. **17** as viewed from a side perspective view with the second terminal and the first terminal in the separated position, in accordance with an embodiment;

FIG. **22** illustrates another example point-of-sale system as viewed from a front perspective view with a first terminal detachably mated to a second terminal, and shown in a fixed position, in accordance with an embodiment;

FIG. **23** illustrates the example point-of-sale system of FIG. **22** as viewed from a rear perspective view, in accordance with an embodiment;

FIG. **24** illustrates the example point-of-sale system of FIG. **22** as viewed from a front perspective view with the first terminal separated from and completely independent of the first terminal, shown in a separated position, in accordance with an embodiment;

FIG. **25** illustrates the example point-of-sale system of FIG. **22** as viewed from a rear perspective view with the first terminal and the second terminal shown in the separated position, in accordance with an embodiment;

FIG. **26** illustrates another example point of sale system as viewed from a front perspective view with a first terminal detachably mated to a second terminal, and shown in a fixed position, in accordance with an embodiment;

FIG. **27** illustrates the example point-of-sale system of FIG. **26** as viewed from a rear perspective view, in accordance with an embodiment;

FIG. **28** illustrates the example point-of-sale system of FIG. **26** as viewed in partial cut-out detailing the card reader and showing a payment card inserted in the card reader, in accordance with an embodiment;

FIG. **29** illustrates the example point-of-sale system of FIG. **26** as viewed from a rear perspective view with the first terminal separated from and completely independent of the first terminal, shown in a separated position, in accordance with an embodiment;

FIG. **30** illustrates the example point-of-sale system of FIG. **26** as viewed from a side perspective view with the first terminal and the second terminal shown in the separated position, in accordance with an embodiment;

FIG. **31** illustrates an example environment for conducting a financial payment transaction in accordance with an alternate embodiment; and

FIG. **32** illustrates an example environment for implementing a merchant payment system.

DETAILED DESCRIPTION

Systems and methods in accordance with various embodiments of the present disclosure overcome one or more of the above-referenced and other deficiencies in conventional approaches to conducting financial transactions. In particular, in accordance with various embodiments, approaches provide for a point-of-sale system configured to enhance financial transactions by streamlining and simplifying components needed in performing a financial transaction. The point-of-sale system includes a secure enclave for accurately receiving and handling secure data provided into the point-of-sale system.

For example, in accordance with various embodiments, the point-of-sale system is a dual-screen stand assembly that includes a merchant terminal and a consumer (or "customer" as used interchangeably herein) terminal. The merchant terminal and the consumer terminal can be mated together in a fixed position to form a single unitary point of sale system including a merchant facing terminal and a consumer facing terminal, or terminals can be separated from each other and arranged in a separated position with each terminal being physically independent of the other. The merchant terminal supports a merchant computing device and is oriented in a merchant-facing direction. The consumer terminal is detachably mated to the merchant terminal and supports a consumer computing device that is oriented in a consumer-facing direction. The point-of-sale system also includes a card reader as part of the customer terminal to perform a payment. The card reader is configured to acceptswipe cards, chip cards (Europay, MasterCard and Visa hereinafter "EMV") or contactless (low power bluetooth or near-field communication, hereinafter "NFC") payments.

The point-of-sale system is configured to present an interface to the merchant terminal. Information regarding an item for sale or a service being provided is received at the merchant terminal. The information is then sent to the consumer terminal and a check-out procedure is initiated. The payment total is sent to the consumer terminal and a payment card can be inserted into the consumer terminal. The consumer terminal has a display that is specific to the type of payment card used so that when a swipe card is inserted, the display provides the appropriate signature, and when a chip-type card is inserted, an appropriate PIN display is provided on the consumer terminal. A secure enclave can be provided to securely store entries that are, for example, entered into a secure enclave of a portable computing device at the consumer terminal. Payment information acquired from the payment card, and the appropriate verification thereof, is provided to a payment system. Payment confirmation is received from the payment system, which can be displayed on one or both of the merchant terminal and the consumer terminal.

Other advantages, variations, and functions are described and suggested below as may be provided in accordance with the various embodiments. Reference is now made to FIG. **1** illustrating an example point-of-sale system **100** including a first terminal **110** including a first computing device **115** (e.g., a tablet computer, a mobile phone, etc.). The computing device can be integrally provided as a component of the first terminal to form a unitary structure or a computing device provided by a manufacturer that is separately provided and inserted into the terminal by the appropriate user. The computing device can include, for example, a processor, a touch-screen display, and a wireless local area network receiver, a physical interface for electronic communication, and a physical interface to receive power (which can be integrated with the physical interface for electronic communication, e.g., in a Universal Serial Bus (USB) connector or other proprietary connector). The first terminal **110** is detachably mated to a second terminal **120**.

The computing device can run a merchant application or other financial transaction software that can provide functionality to facilitate a point-of-sale such as by enabling payment transactions. For example, in accordance with various embodiments, the merchant application can be downloaded and installed on the computing device. The software can be configured to operate with a card reader, where an individual can complete a financial transaction by swiping a magnetic stripe card through the card reader or dipping a chip-type card into the card reader that is connected to the computing device. In this example, the financial transaction can be any transaction that involves receiving or sending payment from one person or entity to another.

The magnetic stripe card can be, for example, a credit card, a debit card, or other types of payment authenticating pieces having a magnetic stripe storing information sufficient to carry out the financial transaction. In accordance with various embodiments, the card reader can be integrated into the consumer terminal to allow the consumer to properly provide the payment card. However, in some embodiments, a separate card reader can be used, such as a miniaturized card reader that is easily connectable to the computing device.

The first terminal **110** and second terminal **120** can be in communication with each other via wired or wireless link. In this example, the first terminal **110** represents a terminal used by a merchant conducting a transaction at a point-of-sale system with a consumer using, for example, a payment card via the second terminal **120**. It is noted that although a payment card is used in some embodiments, transactions can also be conducted through a card-less payment account that is linked to the payment card. Other transactions include person-to-person, account-to-account, electronic cash, among others. It should be further noted that although a credit card is shown to conduct transactions, approaches described herein apply to other types of financial payment instruments including, for example, debit cards, chip-type cards, and card-less payment accounts. As described, in conventional point-of-sale systems, the equipment can be costly and large, requiring additional space and resources. Further, in retail stores where space is limited, a merchant may find it less desirable to have such a large system. Accordingly, in accordance with various embodiments, approaches provide for a streamlined point-of-sale system with a merchant terminal and a consumer terminal detachably mated from the merchant terminal. It is further desirable to securely process and store entries securely entered into the consumer terminal.

The second terminal **120** supports a second computing device **122**. The second computing device **122** is shown integrally formed within the second terminal **120** to provide a single one-piece structure. In some embodiments, another tablet provided separately by the same or another manufacturer, can be inserted into the second terminal **120**. The second terminal **120** includes a secure enclave **124** for securely processing and storing entries into the second terminal **120**, as described in greater detail herein. The second terminal **120** also includes a card reader **126** configured to read both magnetic swipe cards and chip-type cards. Although shown here as a single hybrid slot capable of reading both card types, two readers, in the form of two separate slots, can be provided with one "swipe" slot for receiving a magnetic swipe-type card and a "dip" slot for receiving a chip-type card.

Reference is now made to FIG. **2** illustrating an example schematic diagram of components of each terminal in the point-of-sale system in accordance with an embodiment. The point-of-sale system **200** includes a merchant terminal **210** and a consumer terminal **212**. The merchant terminal **210** includes a SoC (System-on-chip) processor **220** and associated flash memory **222** and RAM **224**. A USB-A port **226** is provided for connecting other devices or components to the merchant terminal **210** as appropriate. A USB+Power port **228** is provided connected to a 5-port USB Hub **230** for various peripherals associated with a point-of-sale system, including a receipt printer, cash drawer, barcode scanner, scale, keyboard, USB-ethernet dongle/USB mifi, and other point-of-sale peripheral components known in the art. While both a USB-A port and a USB+Power port are separately identified, such should not be considered limitation. Merchant terminal can have any number of USB ports, and the ports can be of any suitable characteristics. A power supply **232** can be provided as power through the hub H3 **230** via connector **228** on the merchant terminal **210**. A debug module **236** is provided for appropriate debugging of the merchant terminal **210** and the various components thereof. An audio amplifier **238** is provided and a speaker **240** for providing the appropriate audio for the merchant terminal **210**. A display **242** can be connected to the processor **220**, for example a 13.3-inch LDC display having a resolution of 1920×1080 IPS 166 PPI. The display **242** provides the interfaces and outputs to the merchant terminal **210** to be viewed by a merchant. A wifi receiver **244** is in communication with the processor **220** to perform the wireless communication, for example, with the consumer terminal and other point-of-sale system components, or for example a payment system. And a USB port **246** is provided for detachably connecting the merchant terminal **210** to the consumer terminal **212**. The term "detachably" is intended to refer to the ability for the merchant terminal to be connected to the consumer terminal but also configured to being detached from the consumer terminal when desired for storage, upgrades, or other uses. This mating between the terminals can be through wired connections shown or wirelessly, in some embodiments.

The consumer terminal **212** includes a SoC processor **250** connected to the micro USB **252** for communication with the merchant terminal **210**. A Power Management Integrated Circuit (PMIC) **254** is in communication with the micro USB connector **252**. A PMIC is an integrated circuit for managing power requirements of the host system. A debug module **256** is provided for the processor **250** for the appropriate debugging of the consumer terminal **212** and the various components thereof. The processor **250** is coupled to flash memory **258** and RAM **260** for appropriate storage and processing of data. An audio amplifier **262** and speaker **264** is provided for any audio for the customer on the customer terminal **212**. A display **266** is provided, such as a 7-inch LCD touch-screen display having a resolution of 1280×800 IPS 216 PPI. The display **266** provides interfaces and the outputs of the point-of-sale system to the consumer terminal **212**. A secure enclave **270** is included in the consumer terminal **212**. The secure enclave includes a secure MCU **272**, an anti-tamper battery **274**, and a secure debug module **276**. The MCU **272** receives inputs from the Magnetic Stripe Reader (MSR) **278** which are read by a magnetic head reader **280**. Inputs are also received from EMV contact **282** and processed by an EMV contact block **284**. Inputs from a contactless EMV are received from an EMV contactless antenna **288** and processed by the EMV contactless block **286**. The contactless antenna **288** is dual-use in some embodiments, and configured to receive input from EMV cards and NFC (near field communication) cards, as well as other NFC devices, such as smart phones or other devices configured to process payment transactions. All inputs received by the consumer terminal at the touch controller **292** (for example, as entries into a payment application or a register-buddy application in communication with the merchant terminal), are sent to the secure enclave and the multiplexer **290** determines if the entries should go directly to the non-secure processor, or if further processing (for example, encryption) is needed, and the entries are sent to secure processor. A multiplexer **290** receives inputs from a touch controller **292** and directs inputs received in a non-secure portion of the GUI to the non-secure processor, and directs inputs received in a secure portion of the GUI to the secure processor. In some embodiments, the main processor on the merchant terminal and the consumer terminal will

each run their own operating system (including possibly two different copies of the same operating system, different versions of the same operating system, or different operating systems altogether, etc.).

In an embodiment, a point-of-sale system is used in performing a point-of-sale transaction between a merchant and a consumer. The system includes a merchant terminal including a first display that is oriented in a merchant-facing direction. The merchant terminal further includes: non-transitory computer readable instructions that when interpreted by a merchant terminal processor causes the merchant terminal processor to display a series of screens in a merchant facing graphical user interface for guiding a merchant through a point of sale transaction, a first merchant terminal communication interface configured to communicate with a financial transaction server, and a second merchant terminal communication interface configured to communicate with a consumer terminal. The system also includes a consumer terminal including a second display that is oriented in a consumer-facing direction. The consumer terminal further includes electronics in a physically secure area and electronics in a non-secure area. The electronics in the non-secure area include: non-transitory computer readable instructions that when interpreted by a non-secure consumer terminal processor causes the non-secure consumer terminal processor to display a series of screens in a consumer facing graphical user interface for guiding a consumer through a point of sale transaction, and a consumer terminal communication interface configured to communicate with the merchant terminal. The electronics in the physically secure area include: an input controller within the secure area configured to receive consumer inputs received in the consumer facing graphical user interface, and a secure processor within the secure area configured to receive consumer inputs from the input controller, to encrypt the inputs, and to send the inputs to the non-secure consumer terminal processor for transmission of the encrypted inputs using the consumer terminal communication interface. The merchant terminal configured to receive the encrypted data over the second merchant terminal communication interface, and transmit the encrypted data to the financial transaction server over the first merchant terminal communication interface.

FIG. **3** illustrates an example process for conducting a financial payment transaction in accordance with various embodiments. In the example process **300**, a merchant interface is presented **310** and information regarding an item or a service being purchased is received **312**. Information is sent to a consumer terminal **314** and a check-out procedure is initiated **316**. The payment total is sent to the consumer terminal **318** (for example, displayed on display **266**) and the payment card is received in the consumer terminal **320**. The type of card (swipe, EMV, NFC, etc) being used is determined **322**. A payment interface is presented to the consumer on the consumer terminal based upon the type of payment card used. Accordingly, for example, if a magnetic-stripe swipe-type card is used, then **324** an interface is presented to the user to allow for signature entry, and if a chip-type card is used, then **326** an interface is presented to the user to allow for PIN entry or other secure verification of the use of the card. Payment information is provided to a payment system **328** and a payment confirmation is received at **330**. This can occur via Wifi (**244**) or direct connection via USB (for example **228** in FIG. **2**) in some embodiments. Note that the payment confirmation could also be a confirmation that the payment has been denied. The merchant interface is notified of the completed transaction **332**. The consumer interface can also be notified of the completed transaction in some embodiments.

FIG. **4** illustrates an example diagram of flow of data between the components of the point-of-sale system in accordance with an embodiment. The flow of data between the merchant terminal **410**, the consumer terminal **412** and the payment system **414** are shown. The consumer terminal **412** includes the flow of data to and from both the non-secure processor **416** and the secure processor **418**. The non-secure processor **416**, for example, can be the processor **250** of FIG. **2**, and the secure processor, for example, can be the secure MCU **272** in FIG. **2**.

In accordance with the example diagram, a merchant interface is presented **420** at the merchant terminal **210**. The item or service information is received **422** at the merchant terminal **410** and then provided to the non-secure processor **416** to display the information **424** on the consumer terminal **412**. The check-out procedure **426** is initiated by the merchant terminal **410** once all items and/or services have been entered. The payment total **428** is then provided to the non-secure processor **416** to be displayed on the consumer terminal **412**. A payment card is received **430** and the type of card is determined **432**. If the payment card is an EMV card, the payment information is encrypted **434** by the secure processor **418**. The encrypted payment information **404** is then sent to the non-secure processor **416** to be provided either directly **440** to the payment system **414**, or indirectly send the payment information **438** via the merchant terminal **410** to the payment system **414**. A payment confirmation is generated **442** by the payment system **414** and this payment confirmation is provided **444** to the merchant terminal **410**.

FIGS. **5-8** illustrate a first example point-of-sale system **500**. FIG. **5** illustrates an example point-of-sale system **500** as viewed from a front perspective view, including a first terminal and a second terminal that are detachably mated together and shown in a fixed position, in accordance with an embodiment. The point-of-sale system **500** includes a first terminal **510** configured, for example, to be a merchant terminal in a merchant-facing direction. The first terminal **510** includes a first computing device **512** and a base **514** into which the second terminal is detachably received. The first computing device **512** can be a separate device that is inserted into the terminal or formed integral into the terminal as a single, unitary structure.

FIG. **6** illustrates the example point-of-sale system of FIG. **5** as viewed from a back perspective view, in accordance with some embodiments. The base **514** of the first terminal **510** detachably receives the second terminal **610**. The second terminal **610** can include a first "dip slot" card reader **620** configured to read chip-type cards and a second "swipe slot" card reader **630** configured to read magnetic swipe-type cards. The term "dip slot" refers to a slot or other opening configured to receive or otherwise read a chip-type card via contact or contact-less EMV or NFC communication. The term "swipe slot" refers to a slot or other opening configured to receive a magnetic swipe-type card. In some embodiments, the card reader **620** and the card reader **630** can be replaced with a single hybrid card reader configured to accept both chip-type card and magnetic stripe-type cards.

FIG. **7** illustrates the example point-of-sale system of FIG. **5** as viewed from the back perspective view, and showing the second terminal **610** being separated with ease from the first terminal **610**, as shown by arrow **710**.

FIG. **8** illustrates the example point-of-sale system of FIG. **5** as viewed from a side perspective view and showing

the second terminal completely separated from the first terminal. In this view, each terminal can be physically independent of the other and arranged in a separated position, or mated together as shown in FIG. **5**. When separated as shown in FIG. **8**, the first terminal and the second terminal are in communication with each other or otherwise mated together via wired or wireless communication. As shown in FIG. **8**, the first terminal **510** includes a base **514** having a substantially flat portion **810** that contacts a surface for supporting the first terminal **510** and an upper portion **812**. A payment card **820** is shown inserted in the card reader **620** of the second terminal **620**. The thin wedge shape of the second terminal **620** welcomes customers to pick up and hold the second terminal **620** for usage of the terminal.

FIGS. **9-12** illustrate an example embodiment of a point-of-sale system **900**. FIG. **9** the point-of-sale system **900** as viewed from a front perspective view, including a first terminal and a second terminal that are detachably mated together and shown in a fixed position. The first terminal **910** supports a computing device **912** (e.g., a tablet computer or a mobile device, etc.), or in some embodiments has the computing device formed integrally herewith to form a unitary structure. The first terminal **910** also has a base **914** that detachably receives the second terminal.

FIG. **10** illustrates the example point-of-sale system of FIG. **9** as viewed from a back perspective view. The point-of-sale system includes the first terminal **910** and a second terminal **1010**. In an example embodiment the first terminal **910** is a merchant terminal oriented in a merchant-facing direction and the second terminal **1010** is a consumer terminal oriented in a consumer-facing direction. The second terminal **1010** supports a second computing device **1012**, which can be a separate component or integrated directly into the second terminal to form a unitary structure.

FIG. **11** illustrates the example point-of-sale system of FIG. **9** as viewed from the back perspective view, and showing the second terminal **1010** being separated from the first terminal **910**. The second terminal **1020** can include a hybrid card reader **1120** for receiving a payment card **1110** and can have a groove to facilitate the insertion and removal of the payment card **1110**. The hybrid card reader **1120** is configured to read both chip-type card and magnetic strip-type cards. When in the separated position shown in FIG. **11**, each terminal functions as its own stand for the point-of-sale system, or optionally can function as a single stand as shown in FIG. **8**.

FIG. **12** illustrates the example point-of-sale system of FIG. **9** as viewed from a side perspective view and showing the second terminal **1010** completely separated from the first terminal **910** in a separated position. The first terminal **910** includes a base **910** having a substantially flattened portion **1210** having a base **1212** that contacts a surface for supporting the first terminal **910**. The first terminal **910** also includes a portion **1214** that connects the base to the device-holding or device-integrated portion of the terminal. The base **1212** engages with the legs **1220** and **1222** of the second terminal **1010**.

FIGS. **13-16** illustrate an example embodiment of a point-of-sale system **1300**. FIG. **13** illustrates an example point-of-sale system **1300** as viewed from a front perspective view, including a first terminal **1310** and a second terminal **1320** that are detachably mated together and shown in a fixed position. In an example embodiment, the first terminal **1310** is configured to be a merchant terminal oriented in a merchant-facing direction and the second terminal **1320** is configured to be a consumer terminal oriented in a consumer-facing direction. The first terminal **1310** includes a first computing device **1312** and a base **1314** into which the second terminal **1320** is detachably received.

FIG. **14** illustrates the example point-of-sale system of FIG. **13** as viewed from a back perspective view. The second terminal **1320** is received within the base **1314** of the first terminal **1310**. The second terminal **1320** includes a first "dip slot" card reader **1410** configured to read EMV chip-type cards a second "swipe slot" card reader **1420** configured to read magnetic stripe-type cards. One or both of the card readers **1410**, **1420** can be configured to read contactless payment cards. In some embodiments, the two card readers **1410**, **1420** can be replaced with a single hybrid card reader configured to read both chip-type cards and magnetic strip-type cards. The second terminal **1320** also includes, as a separate component or formed integrally within the terminal, a computing device **1420** configured to perform the processing of information during the transactions performed by the point-of-sale system.

FIG. **15** illustrates the example point-of-sale system of FIG. **13** as viewed from a side perspective view and showing the second terminal **1320** physically independent of the first terminal **1310** and arranged in a separated position. The first terminal **1310** includes a base **1314** having a substantially flat portion **1510** for contacting a surface that supports the terminal **1310** and an upright portion **1512** that supports the computing device portion of the terminal **1310**. The second terminal **1320** has sidewalls **1520** and **1522** that provide privacy for the display of the computing device **1420** when being used by a consumer.

FIG. **16** illustrates the example point-of-sale system of FIG. **13** as viewed from the back perspective view and showing the second terminal completely separated from the first terminal. The tapered surface of the second terminal **1320** and the sides **1520**, **1522** provide for privacy for use of the stand by consumers as appropriate.

FIG. **17** illustrates another example point-of-sale system as viewed from a front perspective view showing a first terminal and including a second terminal not visible in FIG. **17** that is detachably mated to the first terminal, in accordance with an embodiment. The point-of-sale system includes a first terminal **1710**. The first terminal **1710** is configured, for example, to be a merchant terminal in a merchant-facing direction. As shown, the merchant-facing direction shows only the display of the terminal **1710**, and the second terminal is not visible in this view. The first terminal **1710** includes a first computing device **1712** and has a base (**1810** in FIG. **18**) into which a second terminal (**1820** of FIG. **18**) is detachably received. The first computing device **1712** can be integrally provided with the first terminal or another computing device that is separately provided and inserted into the terminal.

FIG. **18** illustrates the example point-of-sale system of FIG. **17** as viewed from a side perspective view showing the first terminal with the second terminal detachably mated thereto, in accordance with an embodiment. The second terminal can, for example, be configured in a consumer-oriented direction. The first terminal **1710** has a base **1810** onto which the second terminal **1820** is detachably mated.

FIG. **19** illustrates the example point-of-sale system of FIG. **17** as viewed from a rear perspective view with the second terminal detachably mated to the first terminal, in accordance with an embodiment. The second terminal **1820** includes a leg portion **1910** that, when the second terminal **1820** is separated from the first terminal **1710**, can be rotated (in the direction of arrow **1920**, for example), so that the second terminal can be independent of the first terminal, as shown, for example, in FIG. **20**. The screen of the second

terminal **1820** has a low angle to provide improved privacy for consumers. A minimalist system is also provided so that the consumer views only the single slab of the consumer terminal **1820** when viewed from the consumer-facing direction.

FIG. **20** illustrates the example point-of-sale system of FIG. **17** as viewed from a rear perspective view, with the second terminal separated from the first terminal in a separated position, in accordance with an embodiment. The second terminal **1820** is completely independent of the first terminal **1810** and supported by the leg portion **1910**. The base **1810** is more clearly visible in this view, the base **1810** providing support for the first terminal **1710** as well as a place for the second terminal to be mated to when in the fixed position as shown in FIGS. **17-19**. As shown in FIG. **20**, a payment card **2010** is inserted into a payment card reader **2012**, which is a chip-type card reader in this embodiment. A swipe slot card reader **2020** is also provided on the second terminal **1820**. In this embodiment, the payment card **2010** is a chip-type card that is inserted into the dip slot card reader **2012**.

FIG. **21** illustrates the example point-of-sale system of FIG. **17** as viewed from a side perspective view with the second terminal and the first terminal in the separated position, in accordance with an embodiment. In this example embodiment, a swipe-type payment card **2110** is shown inserted in the swipe slot card reader **2020**.

FIG. **22** illustrates another example point-of-sale system as viewed from a front perspective view with a first terminal detachably mated to a second terminal, and shown in a fixed position, in accordance with an embodiment. In the point-of-sale system **2200**, a first terminal **2210** includes a first computing device **2212**, which can be an integrally-provided computing device or a separate component inserted into the terminal **2210**. The first terminal **2210** is configured to be a merchant-facing terminal having a base **2215** that supports a second terminal **2220** configured to be a consumer-facing terminal.

FIG. **23** illustrates the example point-of-sale system of FIG. **22** as viewed from a rear perspective view, in accordance with an embodiment. The second terminal **2220** is detachably mated to the first terminal **2210** and received on the base **2215** of the first terminal **2210**. The second terminal **2220** includes a hybrid card reader **2310** configured to read both magnetic stripe-type cards and chip-type cards.

FIG. **24** illustrates the example point-of-sale system of FIG. **22** as viewed from a front perspective view with the first terminal separated from and completely independent of the first terminal, shown in a separated position, in accordance with an embodiment. The second terminal **2220** has been separated from the base **2215** of the first terminal **2210** and is now shown supported on its own base **2410**.

FIG. **25** illustrates the example point-of-sale system of FIG. **22** as viewed from a rear perspective view with the first terminal and the second terminal shown in the separated position, in accordance with an embodiment. The second terminal **2220** includes the card reader **2310** and is supported by base **2410**.

FIG. **26** illustrates another example point of sale system as viewed from a front perspective view with a first terminal detachably mated to a second terminal, and shown in a fixed position, in accordance with an embodiment. The point-of-sale system **2600** includes a first terminal **2610** that can be configured, for example, to be a merchant-facing terminal, that is detachably mated to a second terminal **2620** that can be configured, for example, to be a consumer-facing terminal. The first terminal **2610** includes a first computing device **2612** that, for example, can be a tablet computer, a mobile phone, or a device integrally provided with the first terminal.

FIG. **27** illustrates the example point-of-sale system of FIG. **26** as viewed from a rear perspective view, in accordance with an embodiment. The first terminal **2610** includes a base **2710** that support the first terminal **2610** and also detachably receives the second terminal **2620**. With reference to FIG. **28**, the hybrid card reader **2720** is shown in greater detail. The hybrid card reader **2720** includes a dip slot opening **2810** configured to receive a chip-type card, and a swipe slot **2820** configured to read magnetic stripe-type cards. As shown in FIG. **28**, the card reader **2810** has a payment card **2800** received therein. Note that the card readers are accessible by both the consumers and the merchants in this embodiment when in the fixed position, and thereby a payment card can be inserted and processed by either the merchant or the consumer or both. FIG. **29** shows a swipe-type card inserted into the card reader **2820** and FIG. **30** shows a chip-type card inserted into the card reader **2810**.

FIG. **29** illustrates the example point-of-sale system of FIG. **26** as viewed from a rear perspective view with the first terminal separated from and completely independent of the first terminal, shown in a separated position, in accordance with an embodiment. The second terminal **2620** has a swipe-type payment card **2910** inserted into the swipe card reader **2820**.

FIG. **30** illustrates the example point-of-sale system of FIG. **26** as viewed from a side perspective view with the first terminal and the second terminal shown in the separated position, in accordance with an embodiment. The second terminal **2620** has a chip-type payment card **2912** inserted in the dip slot card reader **2810**.

Having now described various example embodiments of the point-of-sale system using in a point-of-sale transaction, some example environments for conducting a financial transaction at a point-of-sale system will now be described. Other environments and applications of the point-of-sale system should be apparent to those ordinarily skilled in the art.

FIG. **31** illustrates an example environment for conducting a financial transaction at a point-of-sale system in accordance with various embodiments. In this example, the exemplary environment **3100** includes a merchant payment system **3102** for processing transactions between a customer and a merchant. The merchant payment system includes, for example, a data processing server **3104** and a payment server **3106**. The data processing server can be implemented as computer programs on one or more computers in one or more locations, in which the systems, components, and techniques described herein can be implemented. The operation of the payment server is described below in reference to FIG. **32**. The example environment also includes computing devices, e.g., transaction registers or other point-of-sale systems, corresponding to the merchant **3110** and **3111**.

As described, the point-of-sale systems **3110** and **3111** can include the computing device, where the computing device can be coupled to or in communication with the merchant payment system through a data communication network **3108**, e.g., the Internet. These devices each generally include a memory, e.g., a random access memory (RAM), for storing instructions and data, and a processor for executing stored instructions. The devices and can each include one or more components, e.g., software or hardware, that are operable to send and receive requests, messages, or other types of information over the network. Some examples of computing devices include personal computers, cellular phones, hand-

held messaging devices, laptop computers, personal data assistants, tablet devices, and the like.

The network **3108** can include any appropriate network, including an intranet, the Internet, a cellular network, a local area network, a wide area network, or any other such network, or combination thereof. Components used for such a system can depend at least in part upon the type of network, the environment selected, or both. Protocols and components for communicating over such a network are well known and will not be discussed herein in detail. The devices and the referral system can communicate over the network using wired or wireless connections, and combinations thereof.

Each of the computing devices is configured to send to the merchant payment system respective financial data that corresponds to a financial transaction that was processed by the computing device. The financial data can include, for example, data stored in a financial payment card, e.g., Track **1** data, receipt email addresses, and information describing a card-less payment account. Other examples of financial data that can be captured includes purchase data, e.g., an itemized listing of purchases, card mix data, geolocation data indicating a geographic location of a particular transaction, online/offline card data, data describing the merchant, e.g., merchant category codes (MCCs), and any type of data that is received upon a customer's authentication into a social network.

FIG. **32** illustrates an example of an environment **3200** for implementing a payment service network. Although a mobile device environment is described for purposes of explanation, different environments may be used, e.g., a web-based environment, to implement various embodiments. The example environment includes a payment system **3208**, which can be implemented as computer programs on one or more computers in one or more locations, in which the systems, components, and techniques described below can be implemented. The example environment also includes a user device **3202** and a merchant device **3205**.

The user device and the merchant device can each be a computer coupled to the payment system through a data communication network **3250**, e.g., the Internet. The user device and the merchant device each generally include a memory, e.g., a random access memory (RAM), for storing instructions and data, and a processor for executing stored instructions. The user device and the merchant device can each include one or more components, e.g., software or hardware, that are configured to respectively determine a geographic location of the user device or the merchant device, using, for example, various geolocation techniques, e.g., a global positioning system (GPS). Further, the user device and the merchant device can each be any appropriate device operable to send and receive requests, messages, or other types of information over the network. Some examples of user devices include personal computers, cellular phones, handheld messaging devices, laptop computers, personal data assistants, tablet devices, and the like.

The network can include any appropriate network, including an intranet, the Internet, a cellular network, a local area network, a wide area network, or any other such network, or combination thereof. Components used for such a system can depend at least in part upon the type of network, the environment selected, or both. Protocols and components for communicating over such a network are well known and will not be discussed herein in detail. The payment system, the merchant device, and the user device can communicate over the network using wired or wireless connections, and combinations thereof.

As used in this specification, a financial transaction is a transaction that is conducted between a customer and a merchant at a point-of-sale. When paying for a financial transaction, the customer can provide the merchant with cash, a check, or credit card for the amount that is due. The merchant can interact with a point-of-sale device, e.g., merchant device, to process the financial transaction. During financial transactions, the point-of-sale device can collect data describing the financial transaction, including, for example, the amount of payment received from customers.

In some implementations, the payment system is configured to accept card-less payment transactions from customers, e.g., the customer. As used in this specification, a card-less payment transaction is a transaction conducted between the customer and a merchant at the point-of-sale during which a financial account of the customer is charged without the customer having to physically present a financial payment card to the merchant at the point-of-sale. That is, the merchant need not receive any details about the financial account, e.g., the credit card issuer or credit card number, for the transaction to be processed.

In some embodiments, before conducting card-less payment transactions, the customer typically creates a user account with the payment system. The customer can create the user account, for example, by interacting with a user application that is configured to perform card-less payment transactions and that is running on the user device. When creating a user account with the payment system, the customer will provide information of the customer, data describing a financial account of the customer, e.g., credit card number, expiration date, and a billing address. This user information can be securely stored by the payment system, for example, in a user information database. To accept card-less payment transactions, the merchant typically creates a merchant account with the payment system by providing information describing the merchant including, for example, a merchant name, contact information, e.g., telephone numbers, the merchant's geographic location address, and one or more financial accounts to which funds collected from users will be deposited. This merchant information can be securely stored by the payment system, for example, in a merchant information database.

The payment system can be configured to perform card-less payment transactions. The payment system can include one or more servers that are configured to securely perform electronic financial transactions, e.g., electronic payment transactions, between a customer and a merchant, for example, through data communicated between the user device and the merchant device. Generally, when a customer and a merchant enter into an electronic financial transaction, the transaction is processed by transferring funds from a financial account associated with the user account to a financial account associated with the merchant account.

The payment system is configured to send and receive data to and from the user device and the merchant device. For example, the payment system can be configured to send data describing merchants to the user device using, for example, the information stored in the merchant information database **3212**. For example, the payment system can communicate data describing merchants that are within a threshold geographic distance from a geographic location of the user device, as described in this specification. The data describing merchants can include, for example, a merchant name, geographic location, contact information, and an electronic catalogue, e.g., a menu, that describes items that are available for purchase from the merchant.

In some embodiments, the payment system is configured to determine whether a geographic location of the user device is within a threshold geographic distance from a geographic location of the merchant device. The payment system can determine a geographic location of the user device using, for example, geolocation data provided by the user device. Similarly, the payment system can determine a geographic location of the merchant device using, for example, geolocation data provided by the merchant device or using a geographic address, e.g., street address, provided by the merchant. Depending on the implementation, the threshold geographic distance can be specified by the payment system or by the merchant.

Determining whether the user device is within a threshold geographic distance of the merchant device can be accomplished in different ways including, for example, determining whether the user device is within a threshold geographic radius of the merchant device, determining whether the user device is within a particular geofence, or determining whether the user device can communicate with the merchant device using a specified wireless technology, e.g., Bluetooth or Bluetooth low energy (BLE). In some embodiments, the payment system restricts card-less payment transactions between the customer and the merchant to situations where the geographic location of the user device is within a threshold geographic distance from a geographic location of the merchant device.

The payment system can also be configured to communicate with a computer system **3216** of a card payment network, e.g., Visa or MasterCard, over the network, or over a different network, for example, to conduct electronic financial transactions. The computer system of the card payment network can communicate with a computer system **3216** of a card issuer, e.g., a bank. There may be computer systems of other entities, e.g., the card acquirer, between the payment system and the computer system of the card issuer.

The customer operating the user device that is within a threshold geographic distance of the merchant can interact with a user application running on the user device to conduct a card-less payment transaction with the merchant. While interacting with the user application, the customer can select the merchant, from a listing of merchants, with whom the customer wants to enter into a card-less payment transaction. The user can select the merchant, for example, by selecting a "check in" option associated with the merchant. The user device can communicate data to the payment system indicating that the customer has checked in with the merchant. In response, the payment system can communicate data to notify the merchant device that the user has checked in. A merchant application running on the merchant device can notify the merchant that the user has electronically checked in with the merchant through a display screen of the merchant device.

Once checked in, the customer can collect, or request, items that are available for purchase from the merchant. When the customer is ready to enter into the card-less payment transaction, the customer can, for example, approach a point-of-sale for the merchant and identify him or herself. For example, the customer can verbally notify the merchant that the customer wants to enter into a card-less payment transaction and can provide the merchant with the customer's name. The merchant can then interact with the merchant application to select the customer, from a listing of customers that have checked in with the merchant, to initiate a card-less payment transaction for the items being purchased by the customer. For example, the merchant can determine a total amount to bill the customer for the items being purchased. The customer can verbally approve the total amount to be billed and, in response, the merchant can submit a request for a card-less payment transaction for the total amount to the payment system. In response, the payment system can obtain, for example, from the user information database, data describing a financial account associated with a user account of the customer to which the total amount will be billed.

The payment system can then communicate with the computer system of a card payment network to complete an electronic financial transaction for the total amount to be billed to the customer's financial account. Once the electronic financial transaction is complete, the payment system can communicate data describing the card-less payment transaction to the user device, e.g., an electronic receipt, which can, for example, notify the customer of the total amount billed to the user for the card-less payment transaction with the particular merchant.

For clarity of explanation, in some instances the present technology may be presented as including individual functional blocks including functional blocks comprising devices, device components, steps or routines in a method embodied in software, or combinations of hardware and software.

In some embodiments the computer-readable storage devices, mediums, and memories can include a cable or wireless signal containing a bit stream and the like. However, when mentioned, non-transitory computer-readable storage media expressly exclude media such as energy, carrier signals, electromagnetic waves, and signals per se.

Methods according to the above-described examples can be implemented using computer-executable instructions that are stored or otherwise available from computer readable media. Such instructions can comprise, for example, instructions and data which cause or otherwise configure a general purpose computer, special purpose computer, or special purpose processing device to perform a certain function or group of functions. Portions of computer resources used can be accessible over a network. The computer executable instructions may be, for example, binaries, intermediate format instructions such as assembly language, firmware, or source code. Examples of computer-readable media that may be used to store instructions, information used, and/or information created during methods according to described examples include magnetic or optical disks, flash memory, USB devices provided with non-volatile memory, networked storage devices, and so on.

Devices implementing methods according to these disclosures can comprise hardware, firmware and/or software, and can take any of a variety of form factors. Typical examples of such form factors include laptops, smart phones, small form factor personal computers, personal digital assistants, and so on. Functionality described herein also can be embodied in peripherals or add-in cards. Such functionality can also be implemented on a circuit board among different chips or different processes executing in a single device, by way of further example.

The instructions, media for conveying such instructions, computing resources for executing them, and other structures for supporting such computing resources are means for providing the functions described in these disclosures.

Although a variety of examples and other information was used to explain aspects within the scope of the appended claims, no limitation of the claims should be implied based on particular features or arrangements in such examples, as one of ordinary skill would be able to use these examples to derive a wide variety of implementations. Further and

although some subject matter may have been described in language specific to examples of structural features and/or method steps, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to these described features or acts. For example, such functionality can be distributed differently or performed in components other than those identified herein. Rather, the described features and steps are disclosed as examples of components of systems and methods within the scope of the appended claims.

What is claimed is:

1. A point-of-sale system used in performing a point-of-sale transaction between a merchant and a consumer, the system comprising:

a merchant terminal including a first display that is oriented in a merchant-facing direction, the merchant terminal further including:

non-transitory computer readable instructions that, when interpreted by a merchant terminal processor, cause the merchant terminal processor to display a series of screens in a merchant facing graphical user interface for guiding a merchant through a point of sale transaction,

a first merchant terminal communication interface, and

a second merchant terminal communication interface;

a consumer terminal including a second display that is oriented in a consumer-facing direction, the consumer terminal further including electronics in a physically secure area and electronics in a non-secure area, the electronics in the non-secure area comprising:

non-transitory computer readable instructions that, when interpreted by a non-secure consumer terminal processor, cause the non-secure consumer terminal processor to display a series of screens in the second display for guiding a consumer through a point of sale transaction, and

a consumer terminal communication interface; and

the electronics in the physically secure area comprising:

an input controller within the secure area and coupled to the second display to receive consumer inputs received in the second display, the input controller configured to determine if the received consumer inputs require processing by a secure processor, and wherein the input controller comprises a touch controller to receive the consumer inputs and a multiplexer configured to send a first set of consumer inputs requiring further processing by the secure processor to the secure processor and to send the second set of consumer inputs that do not require further processing by the secure processor to the non-secure consumer terminal processor, and

the secure processor within the secure area configured (a) to receive the first set of consumer inputs from the input controller, (b) to encrypt the first set of consumer inputs, and (c) to send the encrypted inputs to the non-secure consumer terminal processor for transmission of the encrypted inputs using the consumer terminal communication interface,

the second merchant terminal communication interface linked to the consumer terminal communication interface by one of a wired or wireless link to receive the encrypted inputs from the consumer terminal communication interface, and the first merchant terminal communication interface configured to transmit the encrypted inputs to a financial transaction server.

2. The point-of-sale system of claim **1** wherein the non-secure consumer terminal processor is configured to send a stripe-card-specific GUI to the consumer terminal when a magnetic stripe-type card is used in payment during the point-of-sale transaction.

3. The point-of-sale system of claim **1** wherein the non-secure consumer terminal processor is configured to send a chip-type-card-specific GUI to the consumer terminal when a chip-type card is used in payment during the point-of-sale transaction.

4. The point-of-sale system of claim **1** further comprising a hybrid card reader configured to receive a payment card used during the point-of-sale transaction, the payment card being a magnetic stripe-type card or an IC chip-type card, the hybrid card reader being coupled to the consumer terminal to perform a payment transaction during the point-of-sale transaction between the merchant and the consumer.

5. The point-of-sale system of claim **1** wherein a confirmation of payment is presented to the merchant terminal merchant facing graphical user interface upon receipt of confirmation of available funds from the financial transaction server.

6. The point-of-sale system of claim **1** wherein the physically secure area further comprises an anti-tamper battery.

7. The point-of-sale system of claim **1** wherein the physically secure area further comprises a debug module.

8. The point-of-sale system of claim **1** wherein the first display comprises a touch screen display.

9. The point-of-sale system of claim **1** wherein the input controller is configured to send consumer inputs received in a secure portion of the second display to the secure processor.

10. The point-of-sale system of claim **1** wherein the physically secure area further comprises a magnetic stripe reading interface, an EMV contact interface and an EMV contactless interface.

11. The point-of-sale system of claim **1** wherein the second display includes a secure graphical user interface portion and a non-secure graphical user interface portion.

12. The point-of-sale system of claim **11** wherein each of the first set of consumer inputs is received by the secure graphical user interface portion and each of the second set of consumer inputs is received by the non-secure graphical user interface portion.

13. The point-of-sale system of claim **1** wherein the physically secure area comprises a secure enclave.

* * * * *